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The FIREPROOFING HAND-BOOK

1914

THIRD EDITION

GF

YOUNGSTOWN, - OHIO.

The Fireproofing Hand Book

(Third Edition)
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Dealing with the Problems of Low Cost Fireproof Construction, Using as a Basis the Reinforcing Material

SELF-SENTERING

A BOOK FOR THE
Busy ARCHITECT
ENGINEER OR
CONTRACTOR

The General Fireproofing Co.
Youngstown, Ohio

Chicago Office - - - - - 325 West Madison Street
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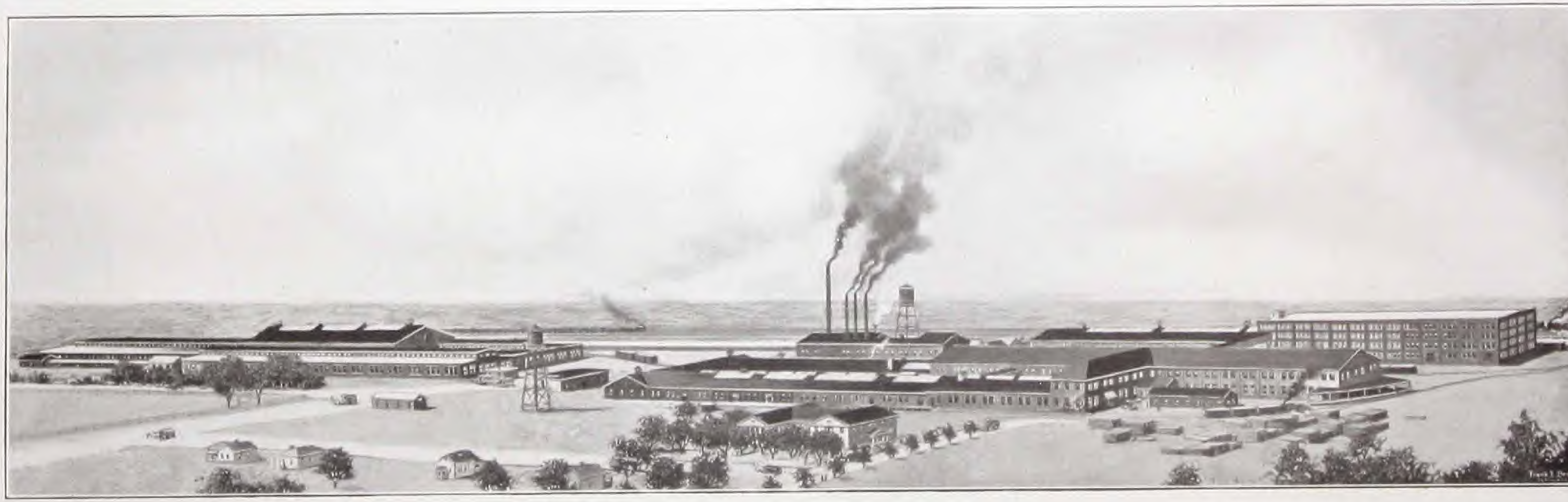


Birdseye View of The General Fireproofing Company's Plant and General Offices
Youngstown, Ohio

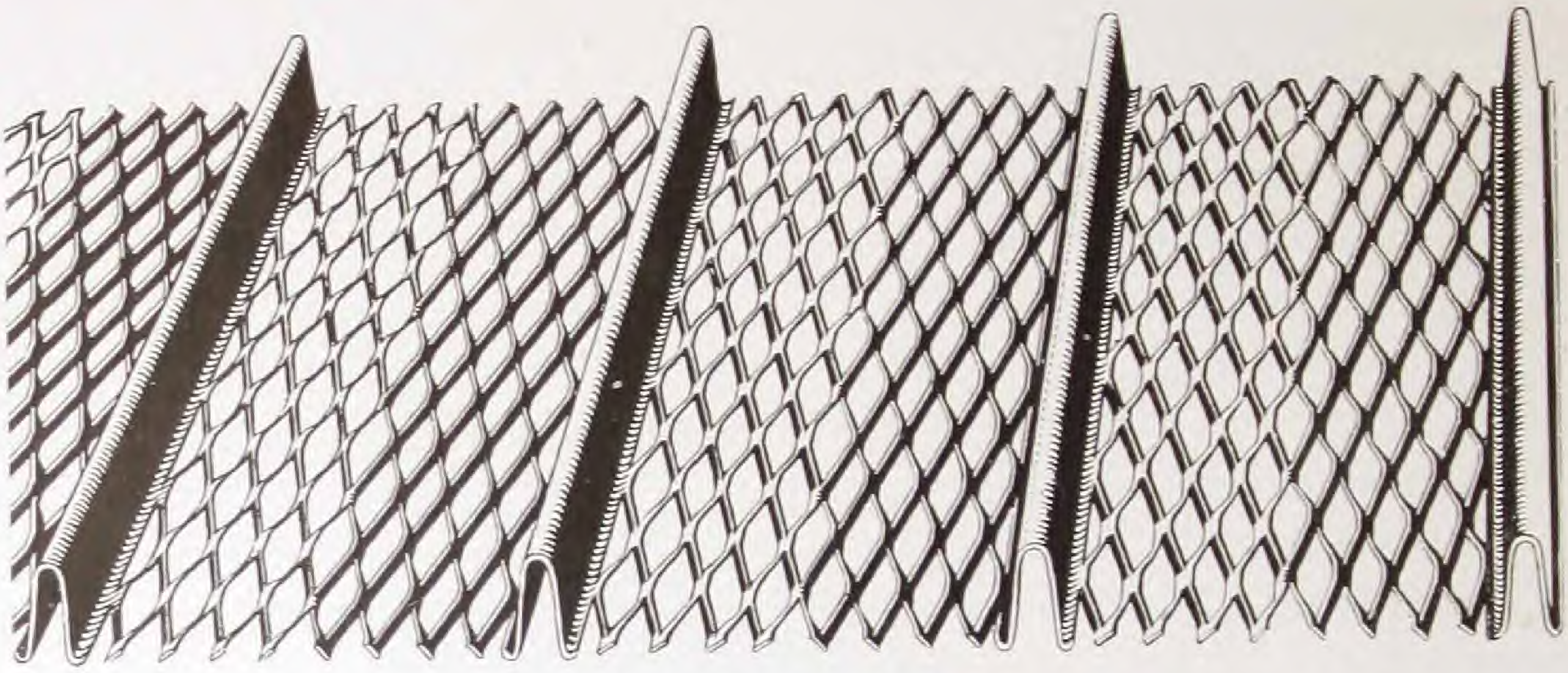
FIREPROOF construction must be recognized as a necessity. The hundreds of millions of dollars fire loss every year confirms this without question. Rather than depend on fire insurance, which merely distributes the losses over the entire populace, the time is coming when fires must be prevented. It is a natural result of the policies of conservation, on which depend the welfare of the individual and the country at large.

This book is issued in an effort to assist the engineer, architect and builder in obtaining the desired end in the most economical manner possible consistent with good practice. Primarily, of course, it is an advertisement, but it is built up on the principle that "service rendered" is the best possible form of advertising.

We have aimed to show every important detail for the various types of construction recommended. Our Engineering Department is at the service of all architects or engineers in working out special details involving the use of our materials. We do not do architectural work, but we will work with and for the architect and engineer for whom this book is primarily intended.

THE
GENERAL FIREPROOFING
COMPANY

Self-Sentering



(Patents Pending)

SELF-SENTERING, as its name implies, is a type of expanded metal for concrete reinforcing and miscellaneous fireproofing, which is, in itself, a combined reinforcing and centering—a one-piece steel lath and stud, or furring.

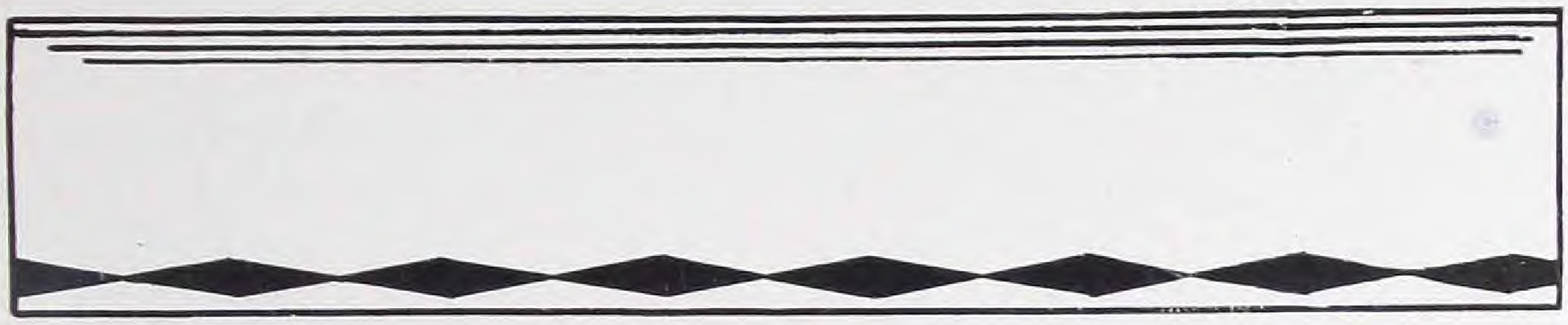
It is made up of a series of heavy, cold-drawn ribs, $\frac{13}{16}$ inch high, always spaced $3\frac{5}{8}$ inches center to center, connected by the most efficient form of expanded metal—all cut and drawn from one sheet of steel.

This material has been perfected after years of study and experiment and it has advantages found in no other reinforcing material on the market. Briefly, they are:

Its heavy ribs are cold-drawn, not stamped, increasing their tensile strength from twenty to forty per cent and their elastic limit from sixty to one hundred per cent. They are made with sides parallel, to give them maximum rigidity, and with a beaded edge at the joining of the expanded metal fabric to stiffen them still further.

The connecting fabric is designed on the only true principle of expanded metal reinforcement. The diamond-shaped meshes diffuse strains from concentrated loads, afford effective continuity of the reinforcement, tend to transfer tensile stresses in the steel to compression in the concrete, and insure that every ounce of metal is in tension. Note there are no breaks at right angles to the line of stress and no metal is wasted to act as mere connecting members. This same mesh affords a perfect mechanical bond for concrete. Roughly speaking, Self-Sentering offers a bonding surface eleven times as great as the same sectional area in reinforcing bars. This same mesh also affords an unbreakable key for plaster or mortar.

Sheets of Self-Sentering are the widest of any similar material made—29 inches and in stock lengths up to 12 feet. This means that the cost of placing Self-Sentering is reduced to a minimum. Every time a 12-foot sheet is applied, 29 square feet of surface is covered. The number of laps is correspondingly decreased, with still more saving in labor.



Longitudinal Section of Self-Sentering. Actual Size

Self-Sentering is made from a special grade of steel manufactured expressly for this purpose and this, together with the peculiar structure of the material, insures it against damage from rough handling in shipment or on the job. While absolutely rigid the long way of the ribs, taken the other way of the sheet Self-Sentering is uniformly pliable. It can be bent and twisted or folded again and again without sign of fracture and returned to its original form as good as new. This characteristic makes it applicable to curved surface work where it is necessary for ribs to run at right angles to the line of curve, without danger from breaking.

Self-Sentering is always furnished with a coating of baked-on enamel to protect it from corrosion until it is placed on the job. The mechanical bond of Self-Sentering is so great that this coating need cause no apprehension.

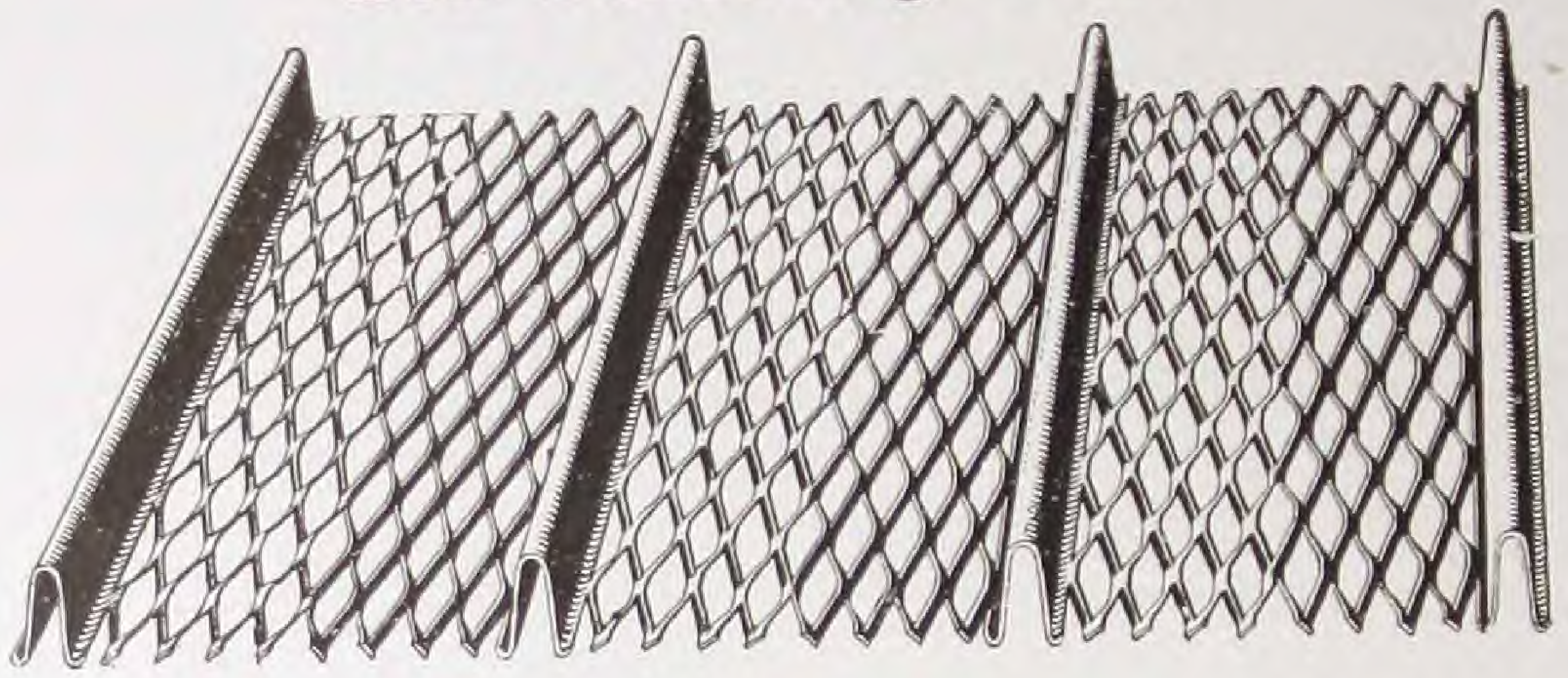
These points of superiority in the material itself are self-evident and they are found in no other similar product.

Self-Sentering finds use in all classes of buildings; for concrete roofs, floors, side walls, ceilings, partitions, columns and beam protection—in industrial buildings, office buildings, warehouses, silos, tanks, garages—such a multitude of uses that it can be fairly classed as a standard for fireproofing reinforcement.

The methods of using Self-Sentering for these various purposes are briefly outlined on the following pages.

Cross Section of Self-Sentering—Showing Side Lap and Method of Punching
Actual Size

Self-Sentering Data



Size of sheets—29 inches wide by lengths of 4, 5, 6, 7, 8, 9, 10, 11 and 12 feet. Longer lengths up to 14 feet furnished on special order. Intermediate lengths will be cut from the next longer sheet and any waste charged to customer.

Height of ribs, $\frac{13}{16}$ inch.

Spacing of ribs always $3\frac{5}{8}$ inches center to center.

Made regularly in the following gauges and weights:

Gauge	Painted Weight	Galvanized Weight	Sectional Area Per Ft. of Width	Shipping Weight Per Sq. Ft. Crated Painted Material
28	.58 lbs.	.72 lbs.	.173 sq. in.	.70 lbs.
26	.70 lbs.	.90 lbs.	.208 sq. in.	.82 lbs.
24	.93 lbs.	Not Made	.277 sq. in.	1.07 lbs.

Galvanized Self-Sentering furnished on special order only.

On special order we can furnish the following:

Gauge	Painted Weight	Galvanized Weight	Sectional Area Per Ft. of Width	Shipping Weight Per Sq. Ft. Crated Painted Material
27	.64 lbs.	.78 lbs.	.187 sq. in.	.75 lbs.
25	.81 lbs.	.96 lbs.	.243 sq. in.	.94 lbs.
22	1.17 lbs.	Not Made	.346 sq. in.	1.30 lbs.

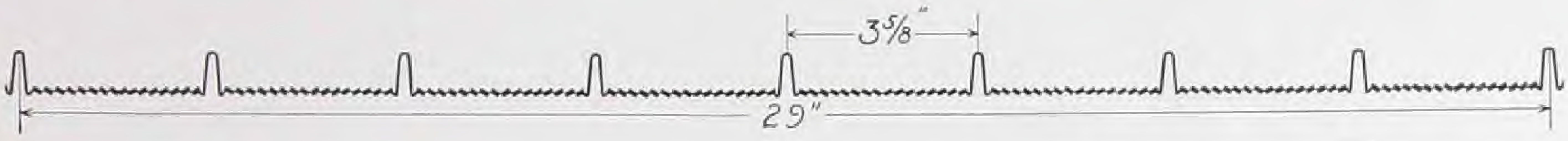
Note that Self-Sentering made from galvanized sheets, also from American Ingot Iron and all special gauges, as shown above, is only furnished on special order and with the usual delays incident to mill delivery of sheets.

Self-Sentering is bundled for shipment in skeleton crates—ends and edges protected by solid wooden strips with heavy cleats across both top and bottom of bundle. Packed 28 or 26 gauge, 14 sheets to the bundle; 24 gauge, 12 sheets to the bundle.

Table of Square Feet, Sheets of Various Lengths

1 in.	.202	2 ft. 6 in.	6.1	6 ft. 0 in.	14.5	9 ft. 6 in.	23.0
3 in.	.604	3 ft. 0 in.	7.3	6 ft. 6 in.	15.7	10 ft. 0 in.	24.2
4 in.	.806	3 ft. 6 in.	8.5	7 ft. 0 in.	17.0	10 ft. 6 in.	25.4
6 in.	1.21	4 ft. 0 in.	9.7	7 ft. 6 in.	18.2	11 ft. 0 in.	26.6
1 ft. 0 in.	2.42	4 ft. 6 in.	10.9	8 ft. 0 in.	19.4	11 ft. 6 in.	27.8
1 ft. 6 in.	3.7	5 ft. 0 in.	12.1	8 ft. 6 in.	20.6	12 ft. 0 in.	29.0
2 ft. 0 in.	4.9	5 ft. 6 in.	13.3	9 ft. 0 in.	21.8		

Self-Sentering Data—*Continued*



Cross Section of Self-Sentering—full width of sheet
Note particularly the close spacing of the ribs and the great width of the sheet

In figuring the covering capacity of Self-Sentering, side laps need not be considered as they are provided for without charge and each sheet has a covering capacity of 29 inches in width. End laps must be allowed as indicated in the specifications.

Self-Sentering for Export Shipment

Self-Sentering for export is carefully packed and bundled at no extra charge. Special attention is given to this feature and shipments to any part of the world reach destinations in first-class condition.

Methods of packing, cubical contents, etc., are given in the following tables:

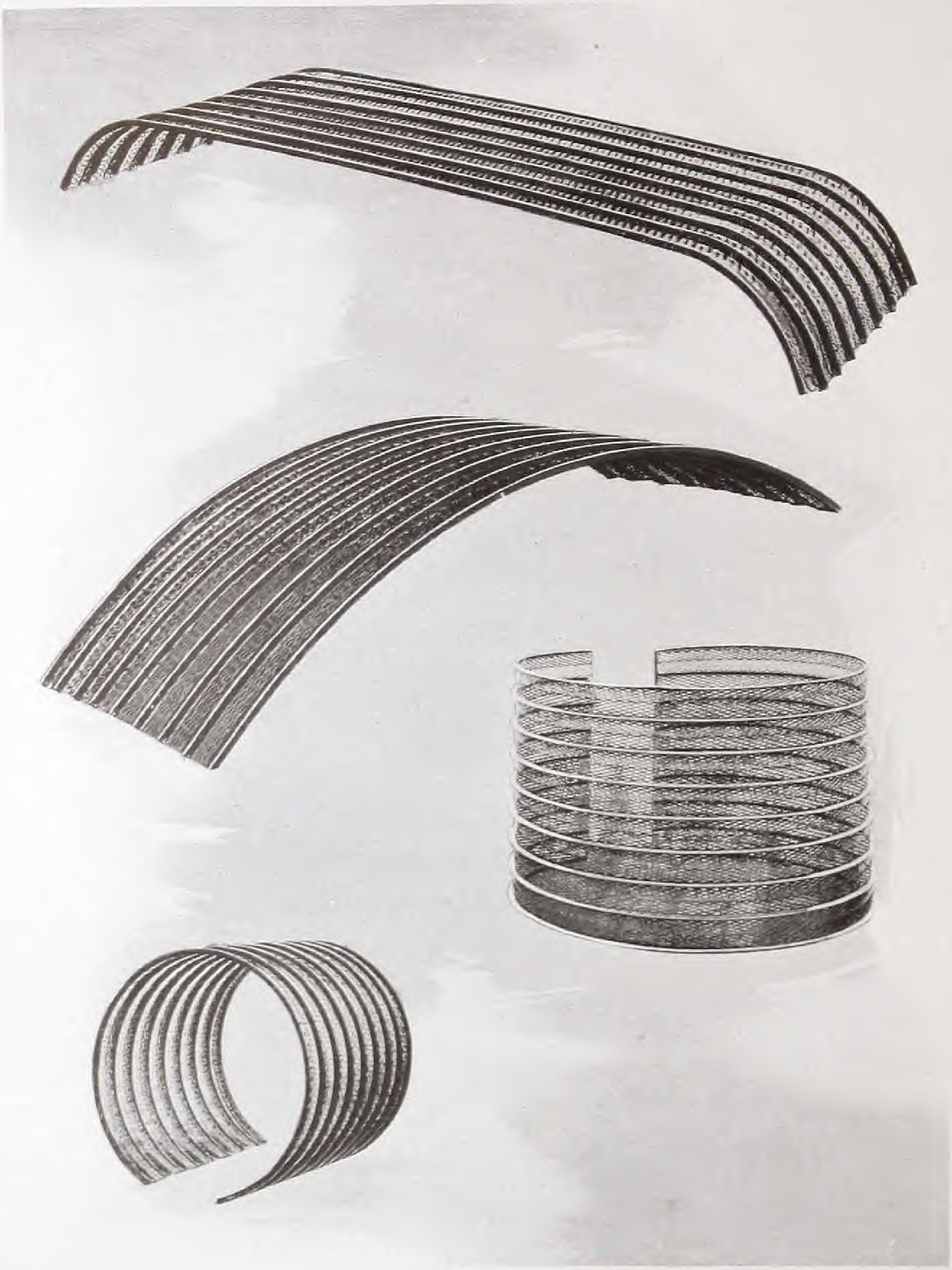
Lgth. Sheet	No. of Sheets Per Bundle			Cubic Contents	Number of Square Feet Per Bundle			Approx. Weight Per Bundle in Pounds		
Feet	24Ga.	26Ga.	28Ga.	Feet	24 Ga.	26 Ga.	28 Ga.	24 Ga.	26 Ga.	28 Ga.
4	12	12	12	.86	116.4	116.4	116.4	110	83	70
5	12	12	12	1.08	145.2	145.2	145.2	137	104	86
6	12	12	12	1.28	174.0	174.0	174.0	164	124	103
7	12	12	12	1.49	204.0	204.0	204.0	192	145	120
8	12	12	12	1.70	232.8	232.8	232.8	219	165	137
9	10	12	12	1.91	218.0	261.6	261.6	205	185	154
10	10	12	12	2.12	242.0	290.4	290.4	227	205	170
11	8	10	12	2.29	212.8	266.0	319.2	200	188	187
12	8	10	12	2.54	232.0	290.0	348.0	218	205	204

This does not contemplate crating, which increases ocean freight materially.

Self-Sentering Punch

This punch is used to eliminate a large proportion of wiring at the laps of Self-Sentering sheets. By its use the interlocking ribs are securely clinched, making further tying unnecessary. Such work is very rapid and leaves absolutely no play in the joints and no opportunity for sheets to sag or bulge. Punches are well made of the best of materials to stand up under this work for years. Shipping weight, nine pounds.

Curved Self-Sentering



Self-Sentering can be curved at our factory to any desired radius—12 inches or larger. This bending is done by special rolls which insure uniformity in the curve not otherwise obtainable and the cost of this work as done in the factory is much lower than if done on the job.

Curved Self-Sentering is adaptable for arched floor or roof slabs, silos, tanks, conduits, chimneys or culverts—any curved work where the stresses follow the line of the curve. On work where the ribs run at right angles to the curve, the material can be readily formed as it is placed, due to its uniform pliability.

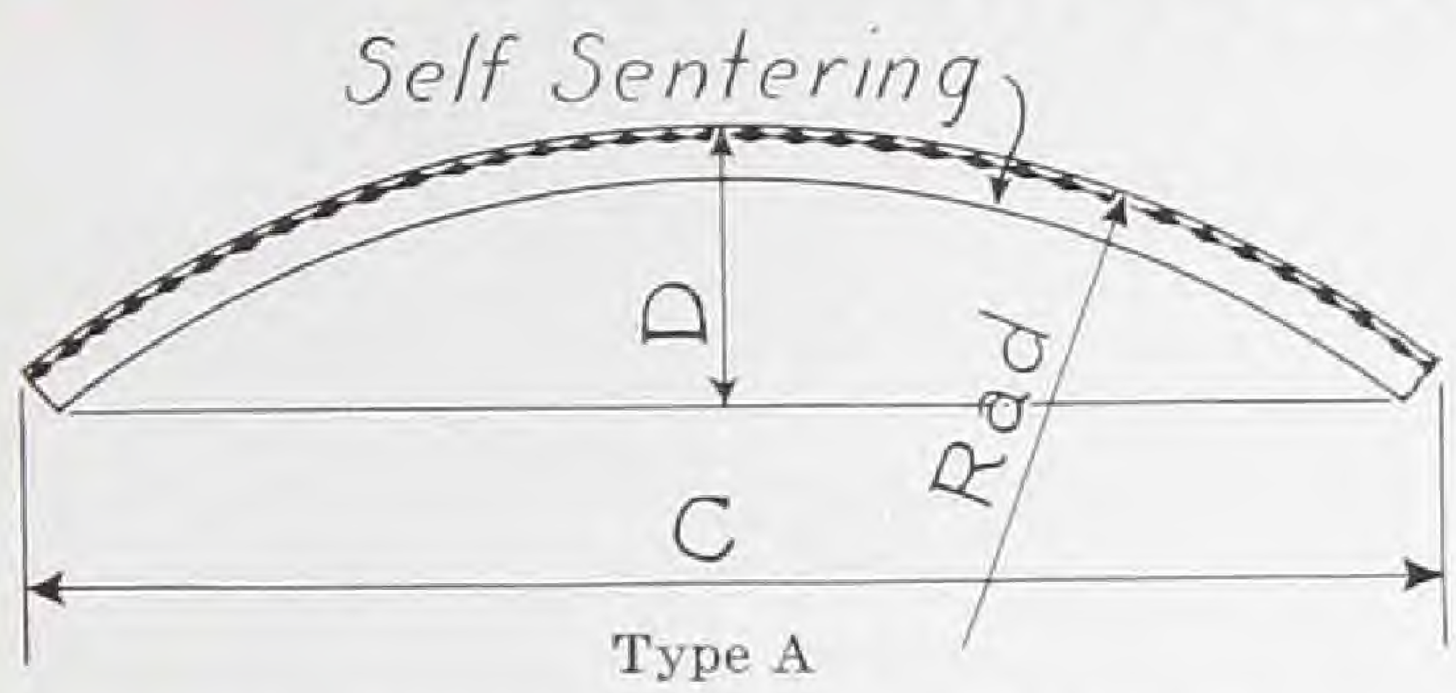
Self-Sentering can be furnished bent in any of the following methods:

Any portion of a circle with a radius 12 inches or over, up to a complete circumference.

Sheets with center portion flat and one or both ends curved to any radius 12 inches or over. Self-Sentering can be furnished curved either way, that is, with ribs on either inside or outside of the arc.

While curved or arched construction is recognized as the strongest type, the expense of curved form work has been almost prohibitive. Self-Sentering, acting as both form and reinforcement, removes this objection.

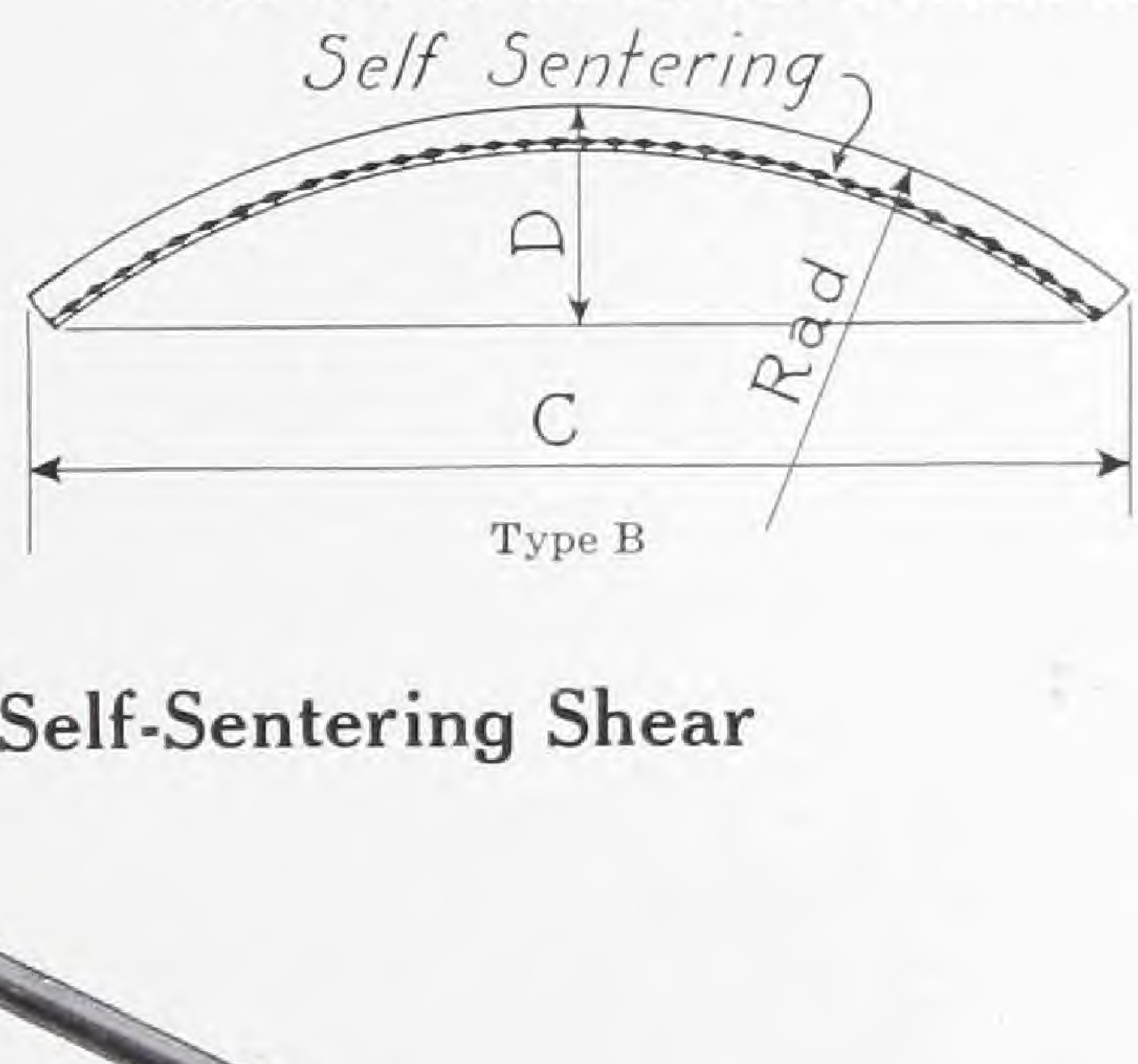
Instructions for Ordering Curved Sheets



Type A

In ordering curved sheets be sure to specify whether the rib is to be on the outside of the arc or on the inside.

Always give the exact length of the chord as indicated by C on sketches shown, and height of rise as indicated by D. Where ribs are to be on the outside of the arc these measurements are to be given from points shown on Type A, and where ribs are on the inside, as on Type B. Where possible, the radius to which sheets are to be curved should also be given.



Type B

Self-Sentering Shear

The Self-Sentering Shear illustrated can be furnished at a reasonable cost and it is recommended as a profitable investment on work of any size. Its use allows the contractor to order stock size sheets and cut them in the field to meet his needs.

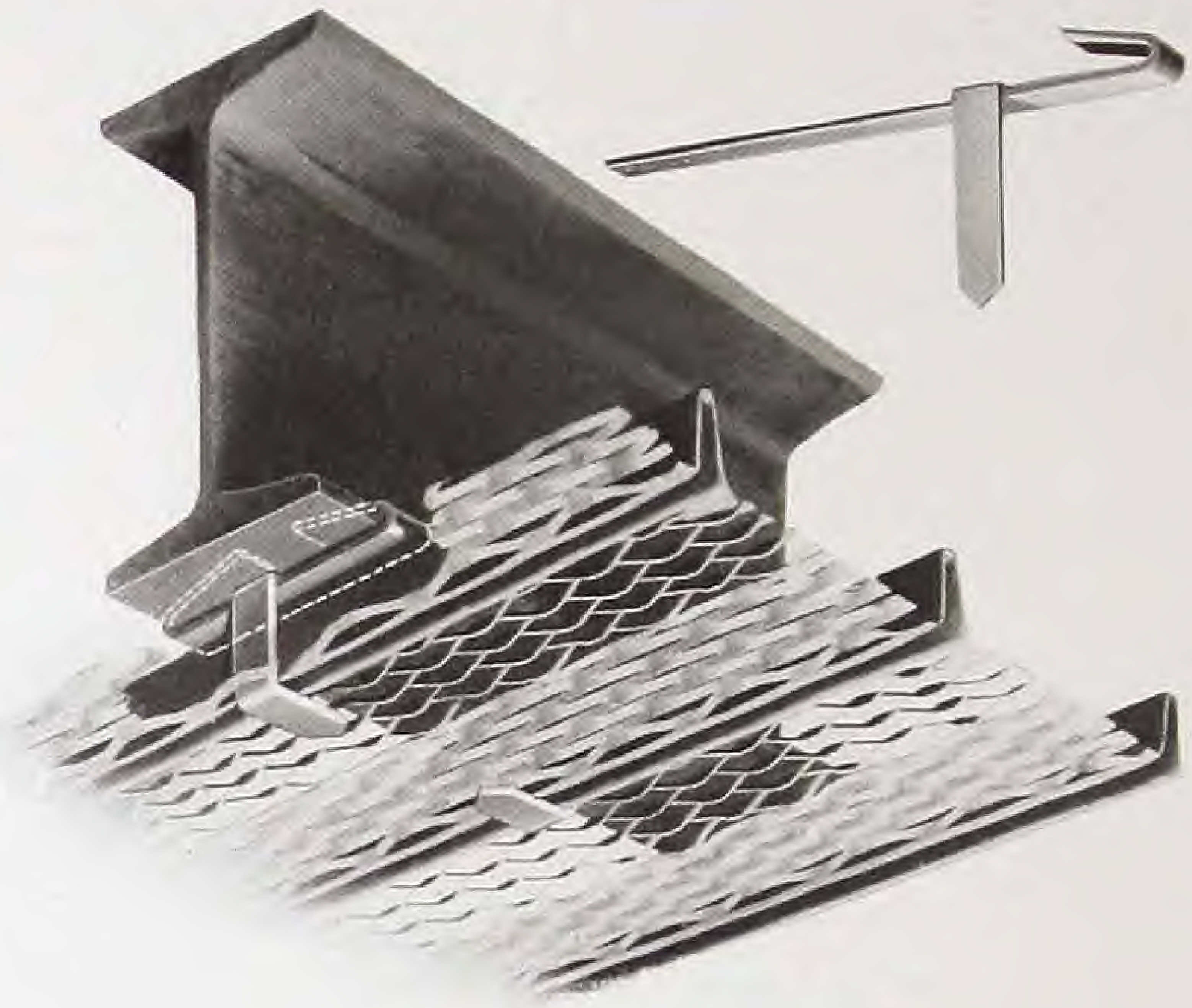
Self-Sentering cannot be readily cut to exact dimensions by ordinary tools and this shear will be the means of a considerable saving in time and material. It is readily transported from one job to another, as it weighs but 72 pounds. We furnish the shear complete and ready to attach to a wood base. The blade is made of a high quality of tool steel and is detachable to facilitate sharpening. The arm, exclusive of the upper blade, measures five feet.

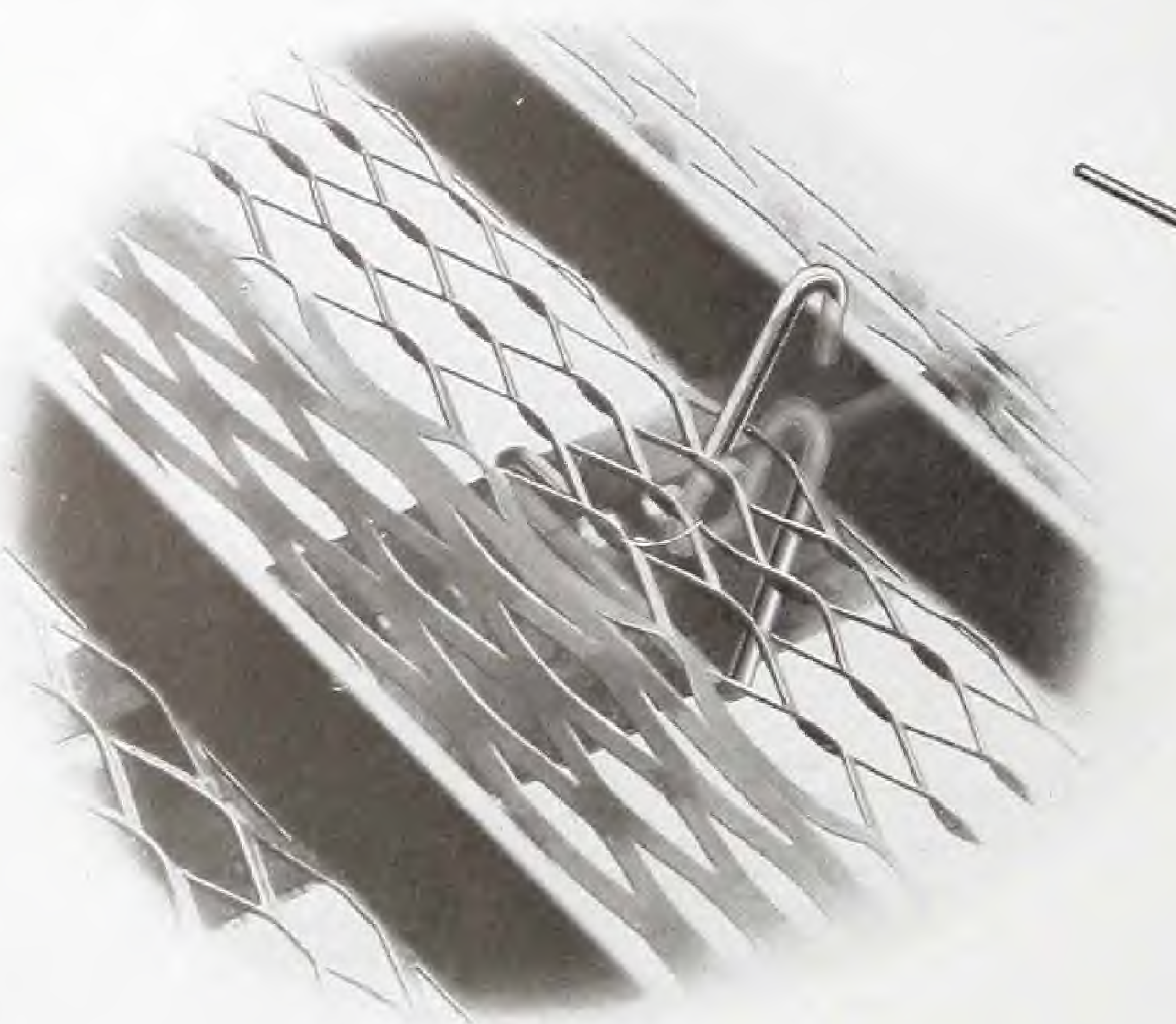
Self-Sentering Clips

Ceiling Clip

This clip is for fastening Self-Sentering to the underside of I Beams and Channels. The prong is electrically welded to the clip and the device possesses unusual strength. It is very simple of application and is made in the following sizes for the various structural members.

Style No.	For Use On
C—1	8″ to 12″ I Beams
C—2	15″ and 18″ I Beams
C—3	20″ and 24″ I Beams
C—4	3″ and 4″ Channels
C—5	5″ and 6″ Channels
C—6	7″ and 8″ Channels
C—7	9″ and 10″ Channels
C—8	12″ and 15″ Channels





Clip No. 4

This clip is used for attaching Self-Sentering to all angles. Always give the size of angles to be used, or order by following style numbers:

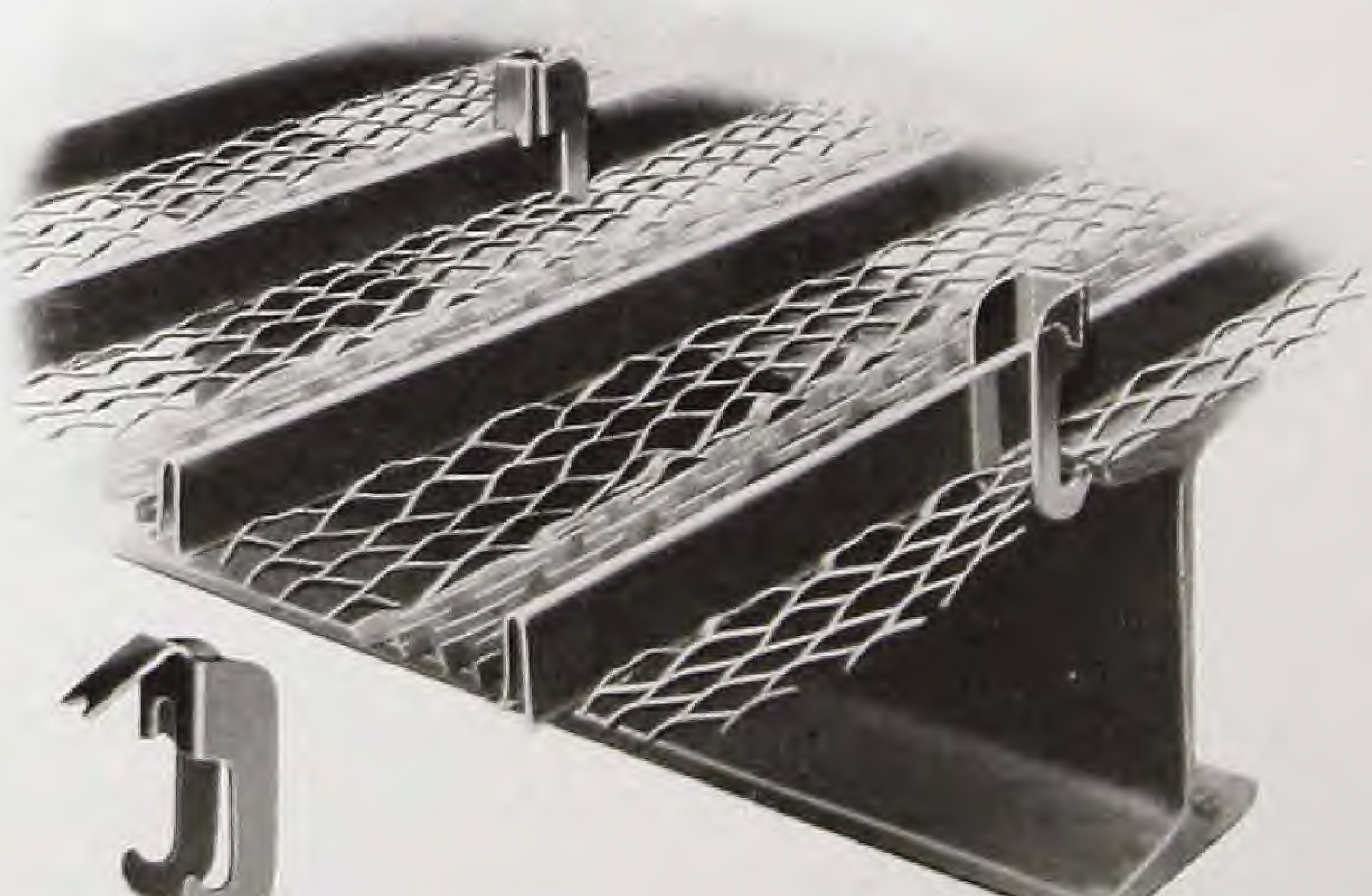
Angles under 3-in. x 3-in. Style 4.75

Angles over 3-in. x 3-in. Style 4.10

Both of these clips are made of No. 10 U. S. G. soft annealed wire and are very easy to place.

Clip No. 5

This clip for fastening Self-Sentering to the face of I Beams, Channels or Angles is very effective. It is applied entirely from the upper side and one man can place them very rapidly. The prongs are set astride the rib of Self-Sentering, down through the mesh and hooked under the flange. With a pair of pliers the clip is then tipped backwards and the lug squeezed down as far as possible. It is then tipped up until the lug stands vertically and indents the top of the rib.



Data Regarding Loads

Table No. 1

For ordinary spans, Self-Sentering does not require centering, but to insure best results the spans shown in table following should not be exceeded without using temporary supports until concrete has set.

GAUGE	SLAB THICKNESS				
	1½ in.	2 in.	2½ in.	3 in.	3½ in.
28	3′ 8″	3′ 3″	3′ 0″	2′ 9″	2′ 6″
26	4′ 0″	3′ 6″	3′ 3″	3′ 0″	2′ 9″
24	4′ 6″	4′ 0″	3′ 8″	3′ 4″	3′ 0″

Table No. 2

The following load tables show *safe live loads* per square foot, uniformly distributed, and in using these tables the dead load need not be taken into further consideration. To get the total safe load, add to the figures shown 12 pounds for each inch in thickness of the slab, plus 6 pounds per square foot for the undercoating of plaster. For instance, a 2-inch slab would weigh 2 x 12 = 24 + 6 = 30 pounds per square foot; thus a 2-inch slab reinforced with 24 Gauge Self-Sentering on a 4-foot span is good for a live load of 258 pounds per square foot, or a total safe load of 258 pounds plus 30 pounds, which equals 288 pounds per square foot.

The slab thickness as shown, in every instance, is considered as above the base of the Self-Sentering and the plastered coat underneath is not included in the computation. The tables are based on a 1:2:4 concrete mix.

Round rods should always be placed over the top of the heavy ribs to take care of temperature stresses. These should be about ¼ inch diameter or No. 5 wire, spaced 30 inches on centers and run at right angles to the ribs.

Safe uniformly distributed live loads per square foot on Self-Sentering Slabs.

Assumptions:

Stress in steel—16,000 pounds per square inch.

Ratio between the moduli of elasticity—15.

Center of gravity—.19 of an inch above bottom of slab.

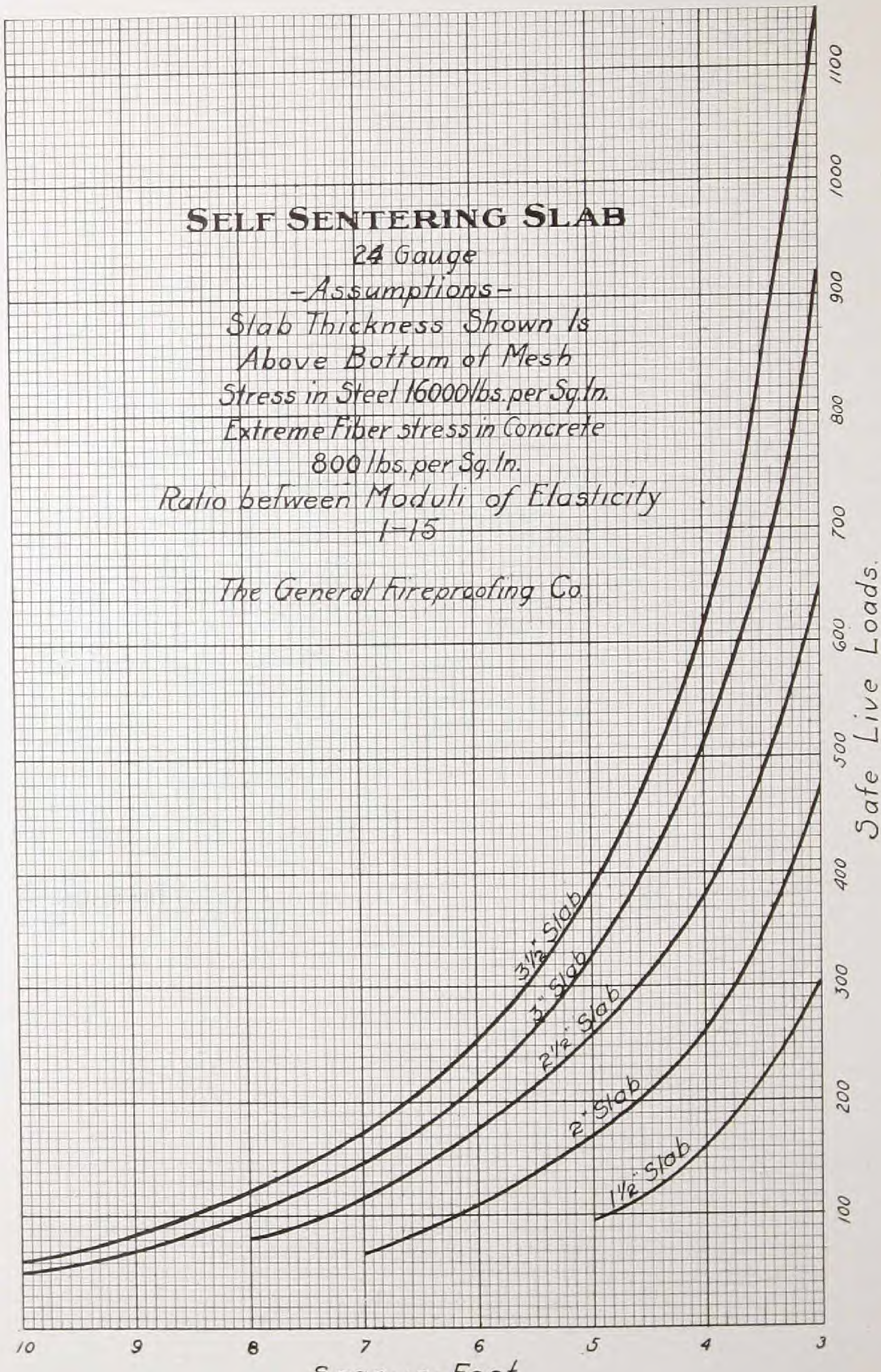
R. M.=Resisting Moments per foot width in inch pounds; f c=maximum extreme fiber stress in concrete.

GAUGE	Thickness of Slab above Mesh	R.M.	f c	SPAN								
				3 ft.	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.
28 Self-Sentering	2″	4360	660	310	164	98	61					
26 " "	2″	5190	760	359	192	128	92	49				
24 " "	2″	6210	800	476	258	166	110	64	30			
28 " "	2½″	5625	560	419	233	150	93	57				
26 " "	2½″	6710	650	484	279	186	118	76	50			
24 " "	2½″	8720	680		377	254	165	111	76			
28 " "	3″	6920	500	561	311	184	114	73	45			
26 " "	3″	8240	560		386	231	147	97	64			
24 " "	3″	10820	660		512	322	210	143	100	69	47	
28 " "	3½″	8250	460		368	218	135	80	50			
26 " "	3½″	9800	500		455	274	174	115	76	50		
24 " "	3½″	12750	610			375	245	166	116	81	56	
28 " "	4″	9500	425		439	261	164	105	68			
26 " "	4″	11300	460		533	320	206	136	91	60	31	
24 " "	4″	14800	560			436	286	196	137	96	67	46

Data Regarding Loads—*Continued*

Table No. 3

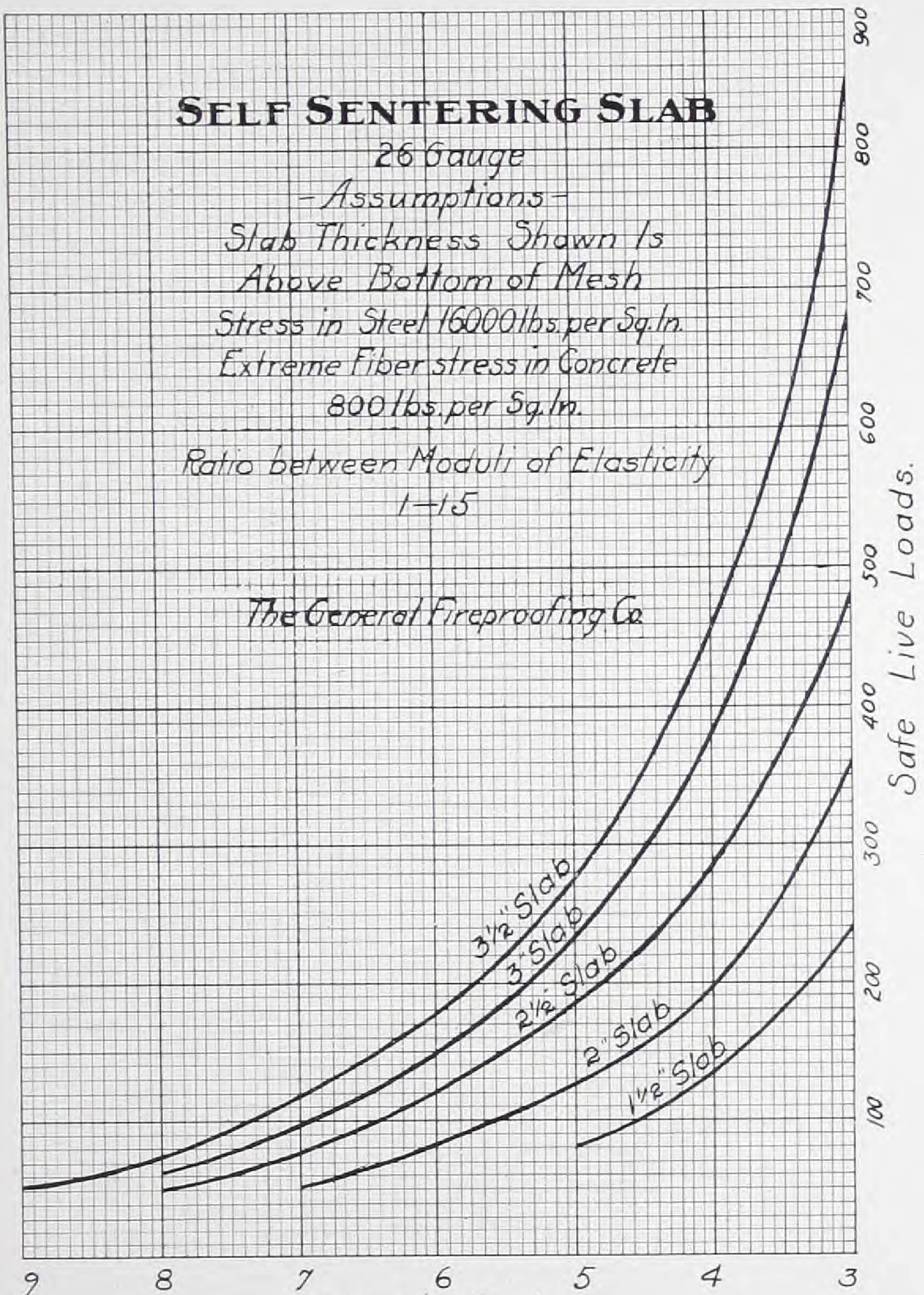
Based on the Use of No. 24 Gauge Self-Sentering



Data Regarding Loads—*Continued*

Table No. 4

Based on the Use of No. 26 Gauge Self-Sentering



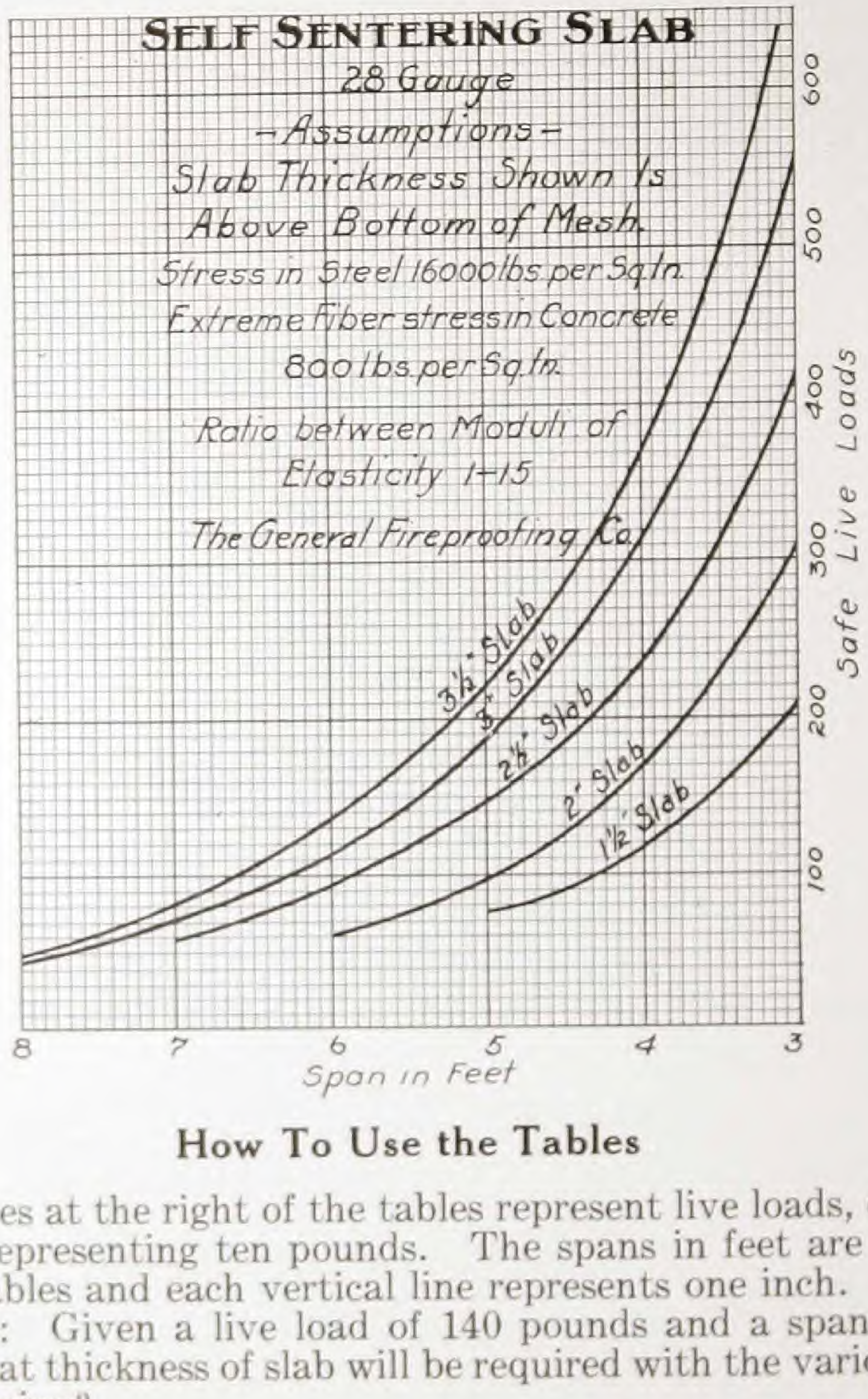
In addition to the load tables shown on the preceding pages the load curves given on this page, page 12 and page 14 enable one to calculate the load bearing capacity of any span by steps of inches within the limits of this type of construction.

These curves are laid out on the same assumptions as the load tables on page 11.

Data Regarding Loads—*Continued*

Table No. 5

Based on the Use of No. 28 Gauge Self-Sentering



How To Use the Tables

The figures at the right of the tables represent live loads, each horizontal line representing ten pounds. The spans in feet are shown at bottom of tables and each vertical line represents one inch.

Example: Given a live load of 140 pounds and a span of 5 feet 4 inches, what thickness of slab will be required with the various gauges of Self-Sentering?

Starting with Table No. 3 (No. 24 Gauge) refer to span at bottom, count 4 vertical lines to the left of the 5-foot point, giving the 5-foot 4-inch span, follow this line up until it intersects the fourth horizontal line above the 100-pound point (giving the 140-pound load) on the right hand side and taking curve nearest to this point, we have a 2-inch slab.

Following the same method on Table No. 4 (No. 26 Gauge) we find a 2½-inch slab required; on Table No. 5 (No. 28 Gauge) a 3-inch slab.

As to which of these should be used depends on the designer's judgment as to whether the decrease in dead load and the increased rigidity afforded by using No. 24 Gauge Self-Sentering and 2-inch slab is preferable to the heavier slabs and lighter gauges of Self-Sentering.

Table for Determining Roof Purlins

Table No. 6

This table will be found useful in designing Self-Sentering roofs and floors and incidentally serve to show the comparatively light framing required for this class of construction.

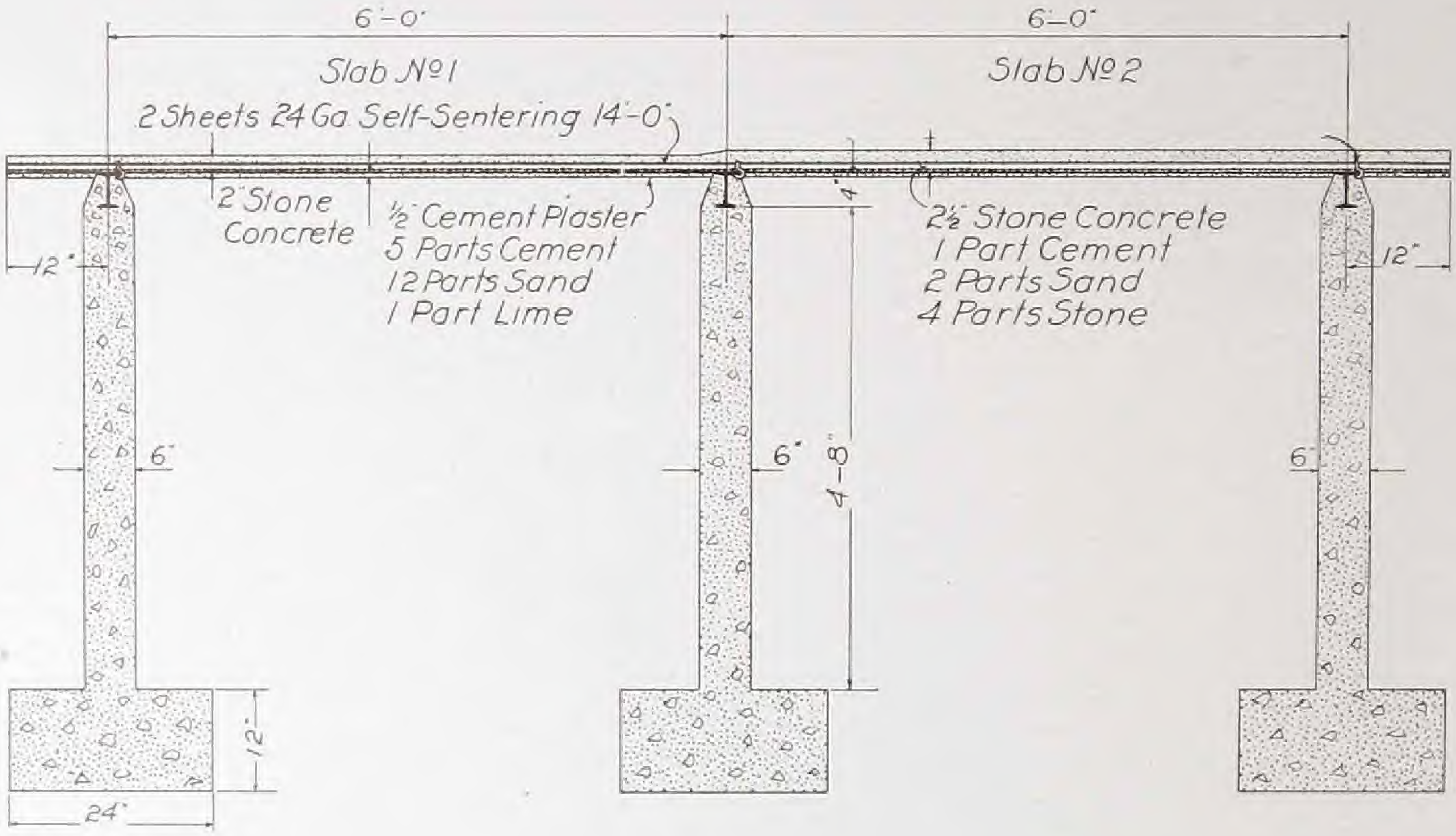
Sizes and Weights per sq. ft. of Purlins to carry Roof Loads

Loads Assumed
- Concrete—12½ lbs. per sq. ft. per inch thickness
- Waterproofing—3 lbs. per sq. ft.
- Snow and Wind—30 lbs. per sq. ft.

Purlin Spacing	Truss Spacing	12′-0″			14′-0″			16′-0″			18′-0″		
	Slab Thickness	2″	2½″	3″	2″	2½″	3″	2″	2½″	3″	2″	2½″	3″
4′-0″	Panel Load	2784	3084	3384	3248	3598	3848	3712	4112	4512	4176	4626	5076
	Size of Purlin	6″[	6″[	6″[	6″[	7″[	7″[	7″[	8″[	8″[	9″[	9″[	9″[
	Wt. Purlin per □′ Roof	2.0	2.0	2.0	2.0	2.44	2.44	2.44	2.81	2.81	3.31	3.31	3.31
4′-6″	Panel Load	3132	3470	3807	3654	4048	4442	4176	4626	5076	4698	5204	5711
	Size of Purlin	6″[	6″[	6″[	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[
	Wt. Purlin per □′ Roof	1.77	1.77	1.77	2.17	2.17	2.17	2.5	2.5	2.5	2.94	2.94	2.94
5′-0″	Panel Load	3480	3855	4230	4060	4498	4935	4640	5140	5640	5220	5783	6345
	Size of Purlin	6″[	7″[	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[	8″I
	Wt. Purlin per □′ Roof	1.6	1.95	1.95	1.95	1.95	2.25	2.25	2.25	2.65	2.65	2.65	3.6
5′-6″	Panel Load	3828	4241	4653	4466	4947	5429	5104	5654	6204	5742	6361	6980
	Size of Purlin	7″[	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	8″I	8″I	9″I
	Wt. Purlin per □′ Roof	1.77	1.77	1.77	1.77	2.05	2.05	2.05	2.41	2.41	3.27	3.27	3.82
6′-0″	Panel Load	4176	4626	5076	4872	5397	5922	5568	6168	6768	6264	6939	7614
	Size of Purlin	7″[	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[	8″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.62	1.62	1.62	1.88	1.88	1.88	2.21	2.21	2.21	3.0	3.5	3.5
6′-6″	Panel Load	4530	5010	5500	5250	5850	6410	6030	6670	7330	6780	7520	8240
	Size of Purlin	7″[	7″[	8″[	8″[	8″[	9″[	9″[	9″[	10″[	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.5	1.5	1.73	1.73	1.73	2.04	2.04	2.04	2.31	3.23	3.23	3.23
7′-0″	Panel Load	4870	5400	5820	5690	6300	6910	6490	7180	7880	7300	8100	8880
	Size of Purlin	7″[	7″[	8″[	8″[	9″[	9″[	9″[	10″[	10″[	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.39	1.39	1.6	1.6	1.89	1.89	1.89	2.14	2.14	3.0	3.0	3.0
7′-6″	Panel Load	5220	5780	6350	6080	6740	7400	6960	7700	8450	7820	8680	9510
	Size of Purlin	7″[	8″[	8″[	8″[	9″[	9″[	9″[	10″[	10″[	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.3	1.5	1.5	1.5	1.77	1.77	1.77	2.0	2.0	2.8	2.8	2.8
8′-0″	Panel Load	5570	6170	6770	6500	7200	7900	7420	8230	9000	8340	9240	10152
	Size of Purlin	8″[	8″[	8″[	9″[	9″[	9″[	10″[	10″[	8″I	9″I	9″I	9″I
	Wt. Purlin per □′ Roof	1.4	1.4	1.4	1.66	1.66	1.66	1.87	1.87	2.25	2.61	2.61	2.61

To find weight of purlin per linear foot, multiply weight per square foot of roof by purlin spacing.

Load and Fire Test



These tests were conducted on October 26, 1912, and November 20, 1912. The test slabs were built as indicated in sketch shown above, using No. 24 Gauge Self-Sentering on 6-foot spans, Slab No. 1 being a 2-inch slab designed for a uniformly distributed live load of 126 pounds per square foot, and Slab No. 2 a 2½-inch slab designed for a uniformly distributed live load of 156 pounds per square foot. The tables shown on pages 17 and 18 give an accurate reading of deflections noted.

At the completion of the load test, the 2-inch slab (No. 1) showed a maximum deflection of .16 inch, which increased to .205 inch twenty-four hours later. This was about 1/352 of the span.

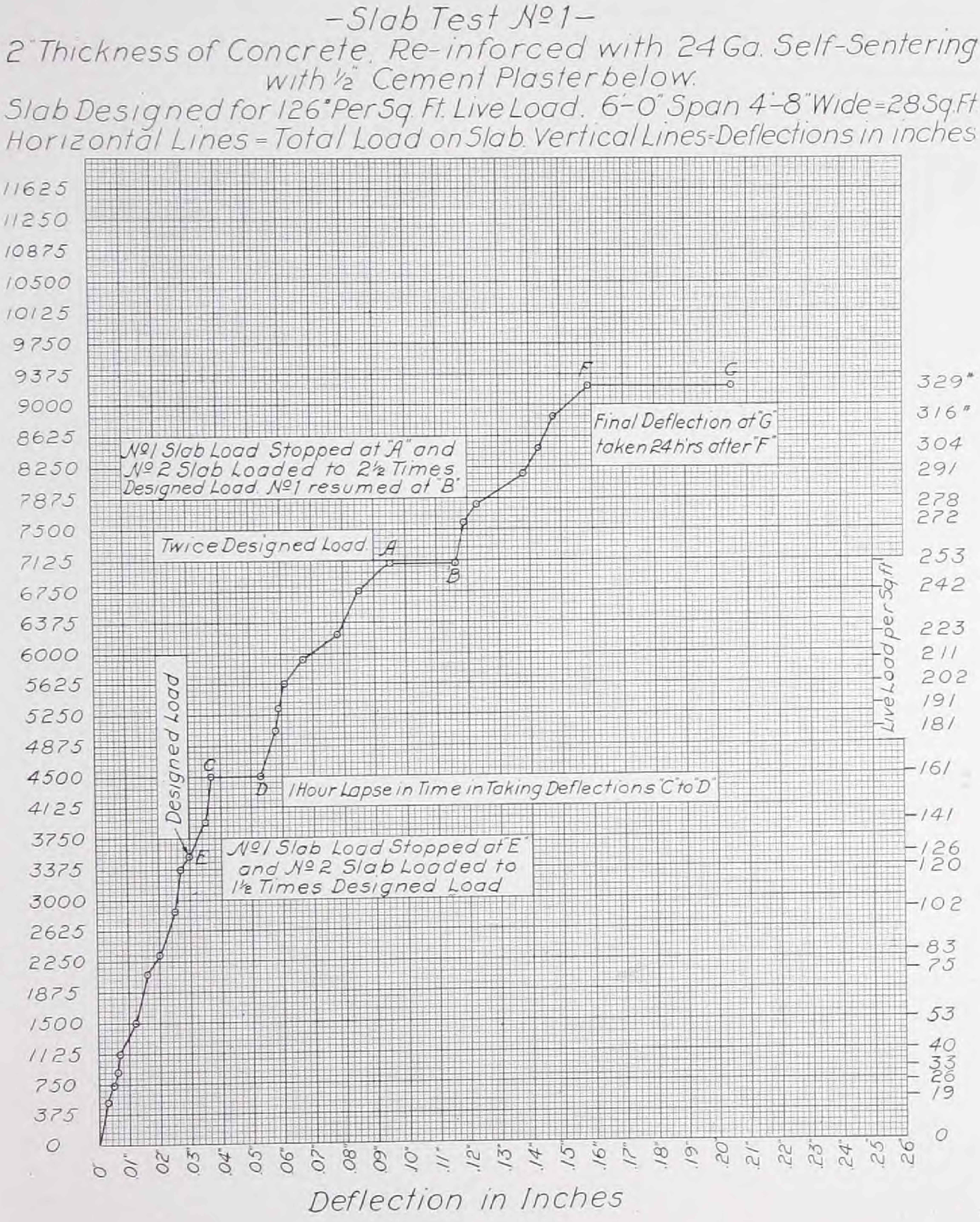
Slab No. 2 showed a deflection of .16 inch at the completion of the test and .19 inch twenty-four hours later, or about 1/378 of the span.

No cracks appeared in the underside of either slab. (Note that final load was 2½ times the designed load.)

At the end of 25 days there was no appreciable increase in the deflection and on November 20th a fire test of the Slab No. 2 still loaded was conducted.

Load and Fire Test—*Continued*

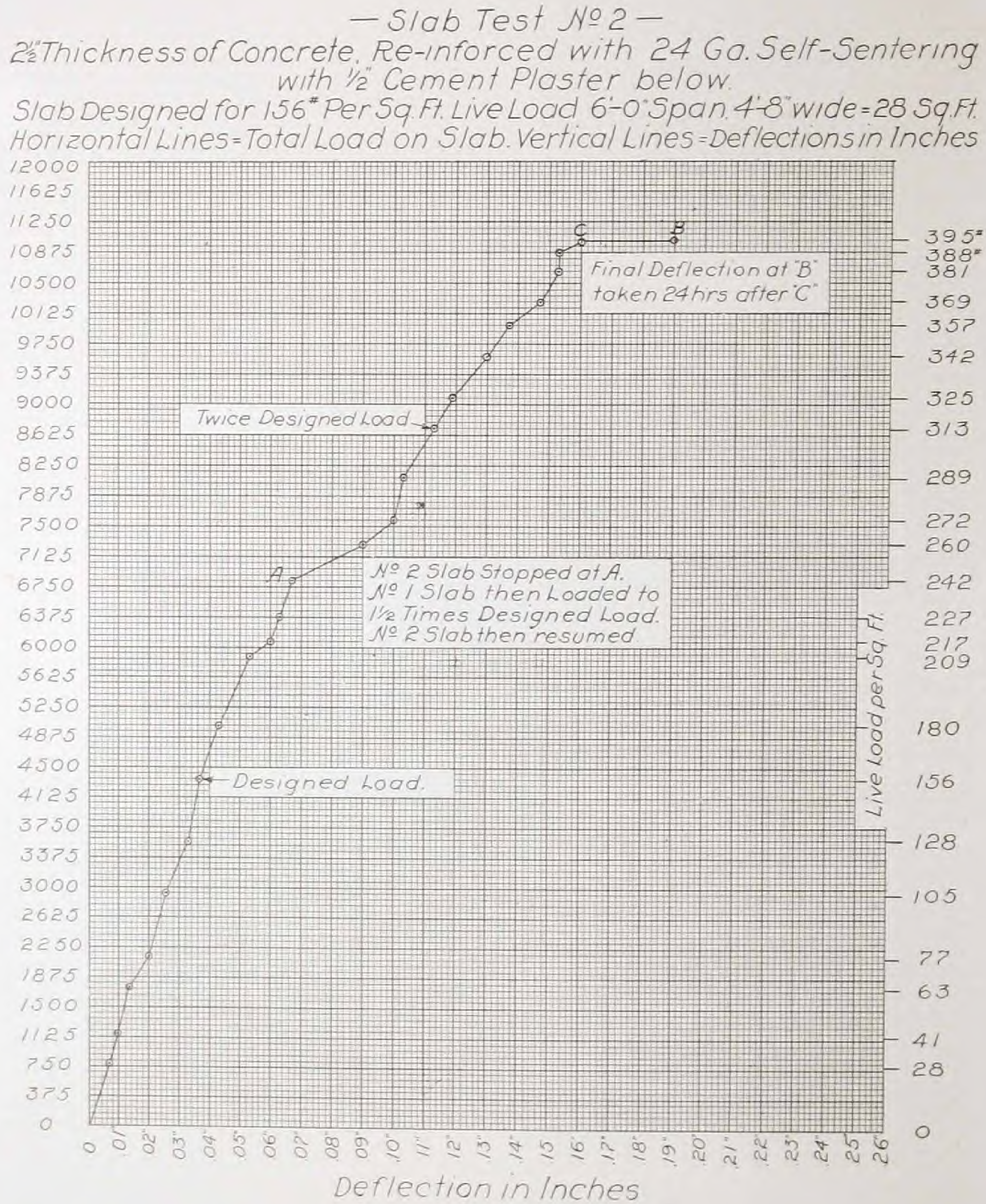
Table No. 11



A furnace was built under the slab and heat furnished by burning coal oil introduced into the furnace under high pressure. The test was continued for two hours with an average temperature after the first half hour of 1612 degrees, with a maximum temperature of 1725 degrees. At the end of the two-hour test, water at city pressure was turned on the underside of the slab from a distance of 20 feet for a

Load and Fire Test—*Continued*

Table No. 12



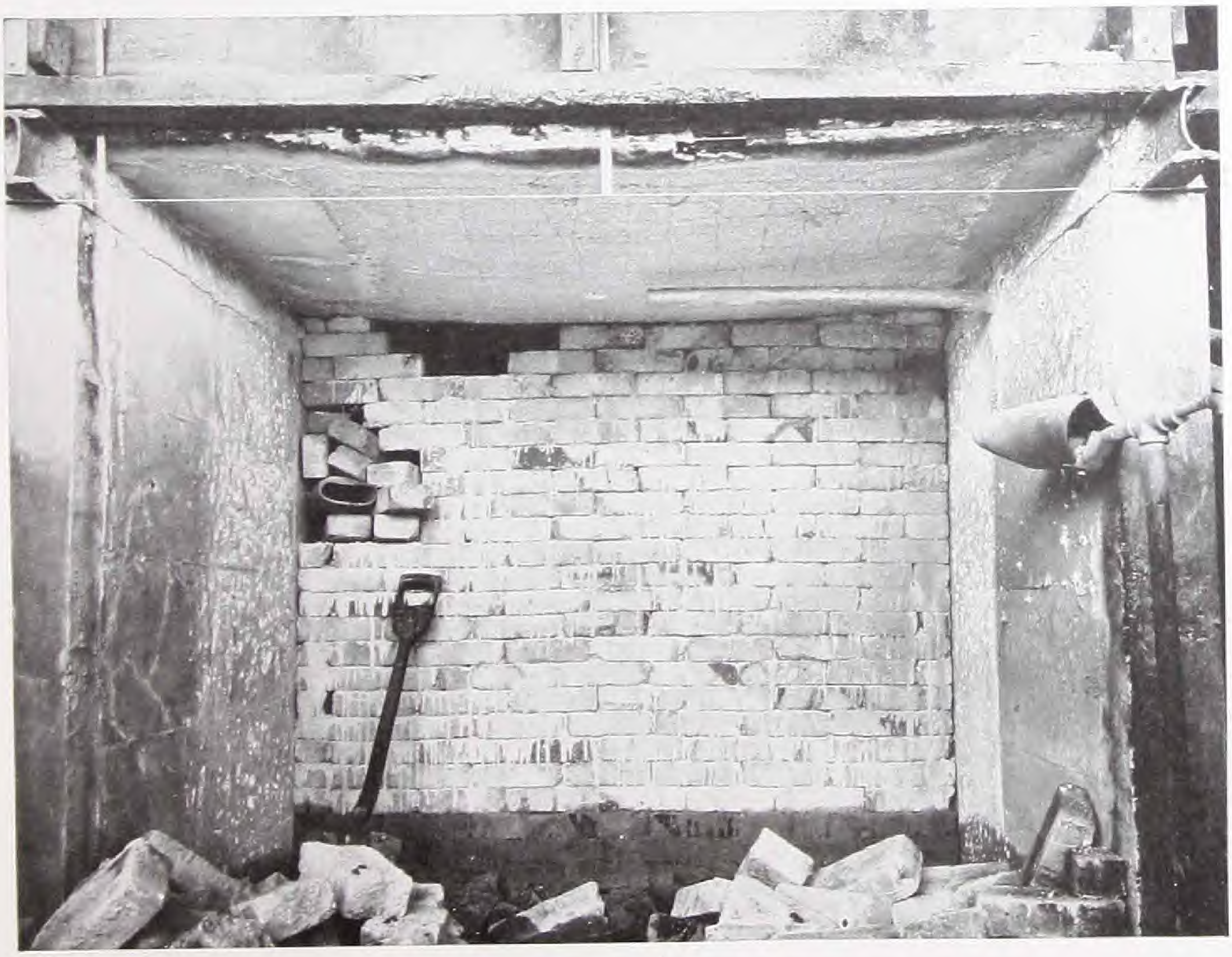
period of 2½ minutes. The finish coat of plaster spalled off, but the metal was not exposed at any point. A number of fine cracks were apparent—running in both directions—and the total deflection of the slab (still loaded to 394 pounds per square foot), was about 1½ inches.

The photographs shown on page 19 give a good idea of the method of conducting the test and the results obtained.

Load and Fire Test—*Continued*

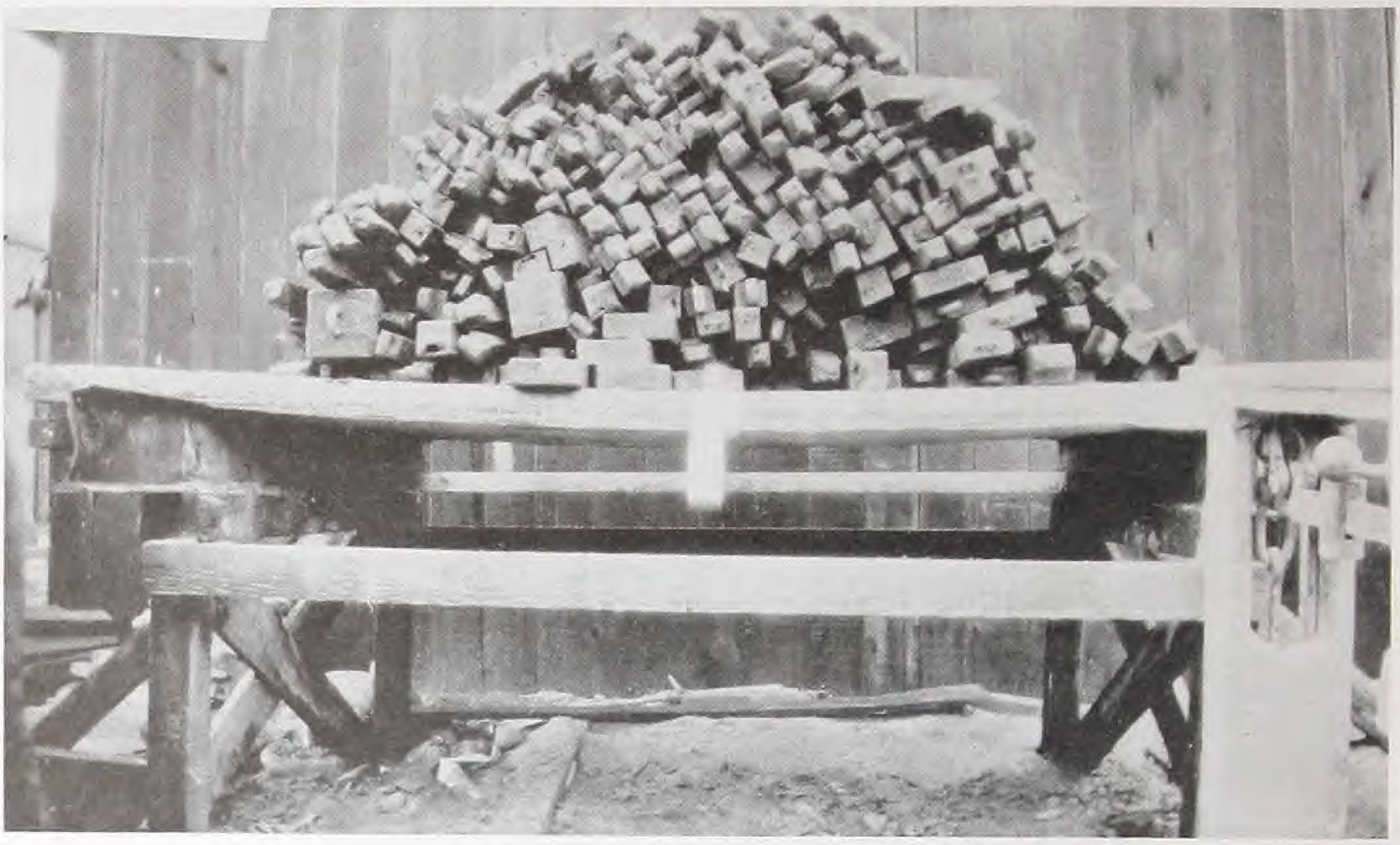
Self-Sentering Slab During Load Test

Self-Sentering Slab During Fire Test



Underside of Self-Sentering Slab after Fire Test
(For explanation, see page 16)

Load Test to Destruction



Photograph of Test with Maximum Load (500 lbs. per sq. ft.). Failure began at this Point.

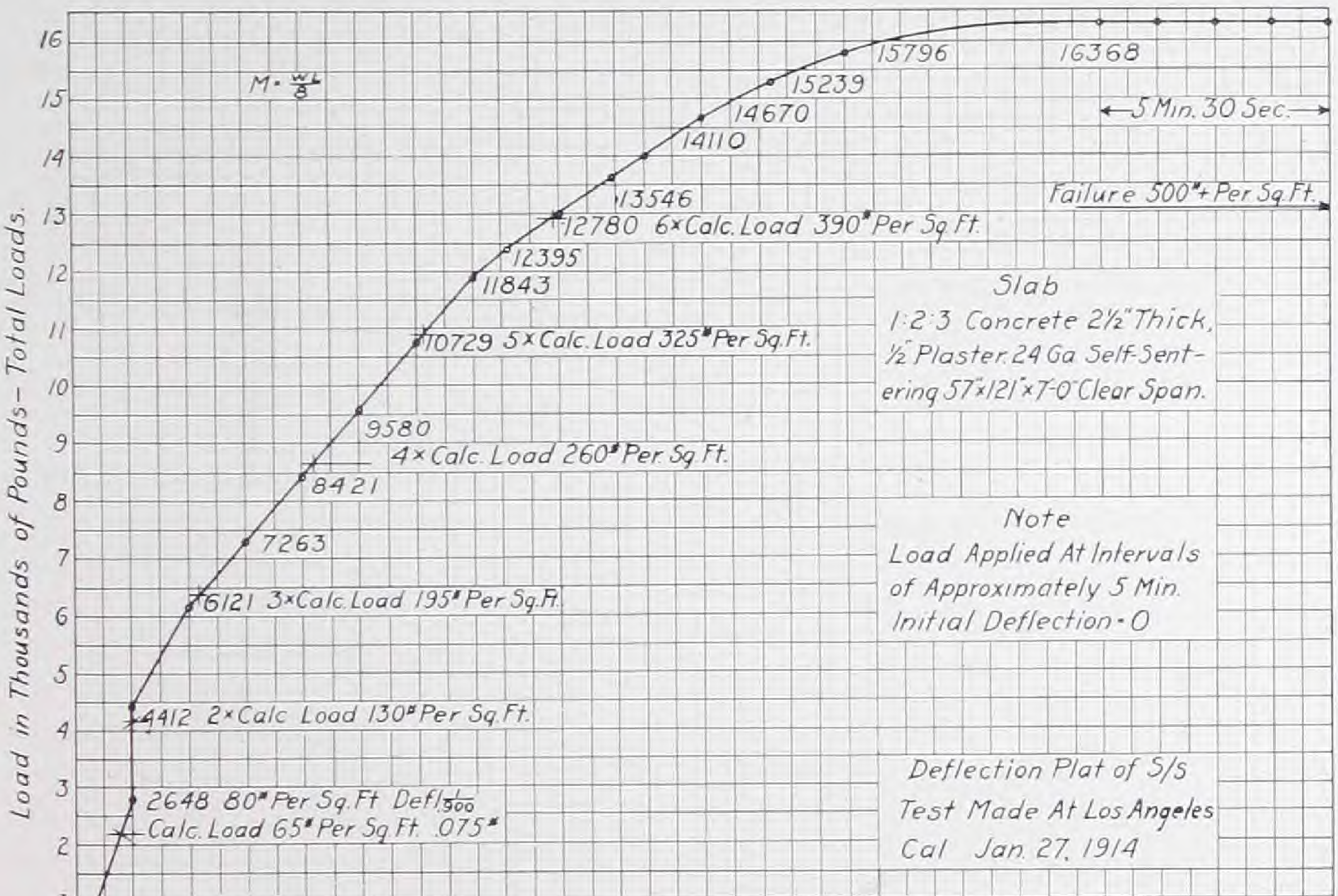
This test was conducted at Los Angeles, Cal., on January 27, 1914.

The slab was built on November 15, 1913, using No. 24 gauge painted Self-Sentering, the span being 7 feet 0 inches clear and the concrete 2½ inches thick above the mesh. The slab was 74 days old when tested and the table shown on page 21 gives an accurate reading of the deflections noted.

It will be seen that the deflection was less than 1 inch, with the slab loaded to four times the load it was calculated to carry and that failure did not occur until the slab was loaded to over 500 pounds per square inch.

The stress in the steel immediately before failure reached over 60,000 pounds per square inch and in the concrete over 3,000 pounds per square inch at the extreme upper edge of the slab.

Los Angeles Test Chart

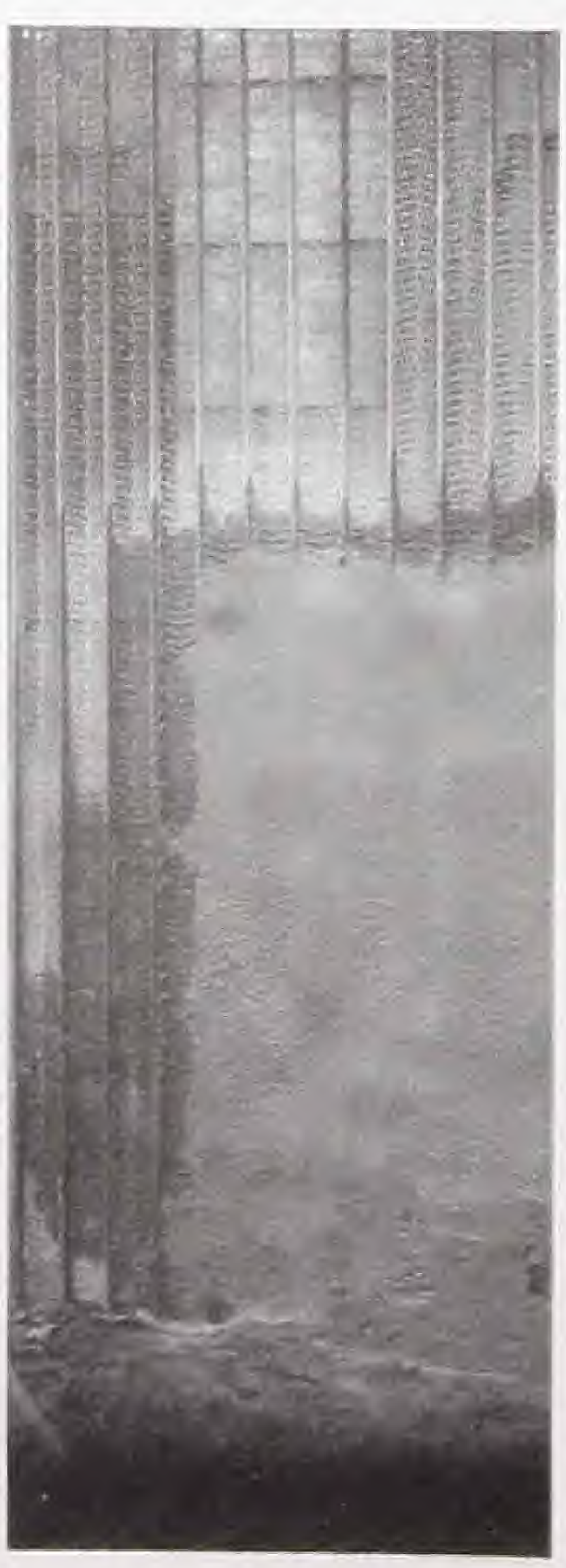


Fire Test on Self-Sentering Partition

A fire test of Self-Sentering 2-inch solid partitions was made on November 20, 1912.

The partition was 7 feet wide by 9 feet high; the Self-Sentering was run vertically and plastered on both sides with cement plaster to a total thickness of 2 inches. This partition formed the door for the furnace in which the heat was generated. Kerosene oil under high pressure was used as fuel.

The fire was allowed to burn for 2 hours with a temperature averaging 1849 degrees after the first half hour, and a maximum temperature of 2015 degrees. While the partition showed some deflection and a number of cracks on the outside, no smoke came through at any time, and when the door was opened there were but two small cracks on the side exposed to the fire. Water at city pressure was then turned on for $2\frac{1}{2}$ minutes, and while sections of plaster of the fire side were washed off, the water did not go through the partition and it was evident that it was still in shape to resist a great deal of heat. The photo at the left above shows the outside of the partition and the one at the right, the inside, both taken after the fire.



The Cement Gun

In some localities the Cement Gun is being used for the application of cement plaster, and in a test recently made in Pittsburgh, Pa., it was proven conclusively that Self-Sentering is admirably adapted to this method.

The photograph shown here is of a part of the wall on which the test was made, and it was found that no backing such as is required with the more open mesh fabrics is necessary with Self-Sentering.

Self-Sentering Roofs

REINFORCED concrete makes the highest type of roof—at once fireproof and enduring, and with practically no maintenance expense. The only objections ever made to a concrete roof have been its comparatively high cost and weight. The use of Self-Sentering as both form and reinforcement overcomes both of these.

First, because no forms are required. The heavy ribs give ample rigidity to support the weight of the wet concrete.

Second, because the large sheets permit the rapid erection of such a roof with a minimum labor expense. These same large sheets require the fewest possible laps and this also increases labor efficiency.

Third, because the slabs need be but 2 inches in thickness, cutting the dead load in half as compared with the ordinary concrete roof. This is not only a saving in labor and material on the roof itself, but very often permits the use of much lighter supporting framing.

Though Self-Sentering Roofs are comparatively light, a study of the Safe Load Tables given on page 11 will show that their strength is far in excess of all roof requirements.

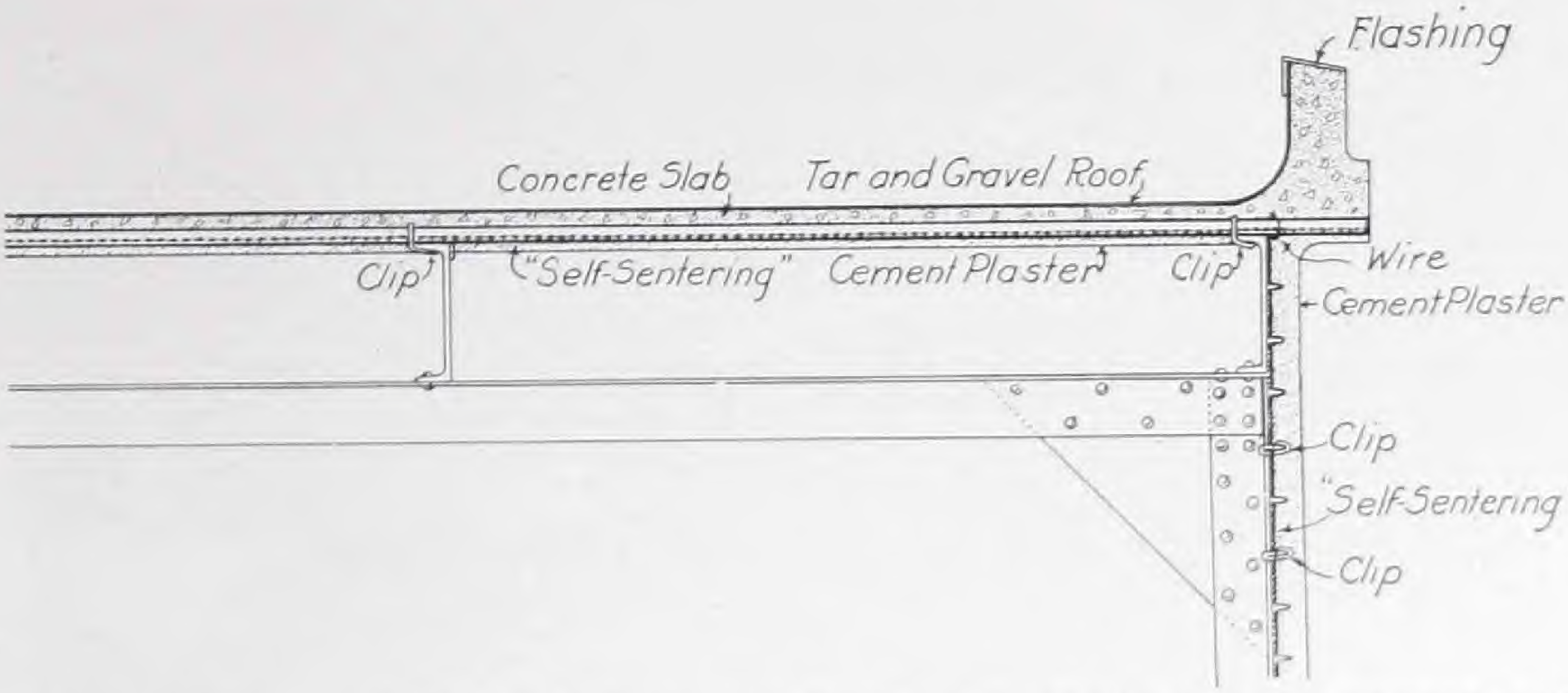
Self-Sentering Roofs are particularly adapted to steel frame buildings, but they are used economically and effectively on wood or concrete framing as well. The sheets are merely laid over the roof purlins, attached to them securely by clips, wire, nails or staples and the concrete applied to the required thickness. Only enough passes through the mesh to thoroughly imbed the steel. The underside is then plastered with cement mortar and the roof is complete, ready for waterproofing.

Self-Sentering opens up a comparatively new field for concrete roofs, namely, on buildings where pitched roofs are desired. Heretofore pitched roofs of concrete have not been considered practicable as there was no economical method of keeping the concrete in place on the inclined surface until it had set. Self-Sentering, in addition to acting as form and reinforcing, also gives a bond for the concrete so that it is readily used on roofs of any character—pitched roofs, domes, saw-tooth or flat—and at practically the same cost for one as for the other.

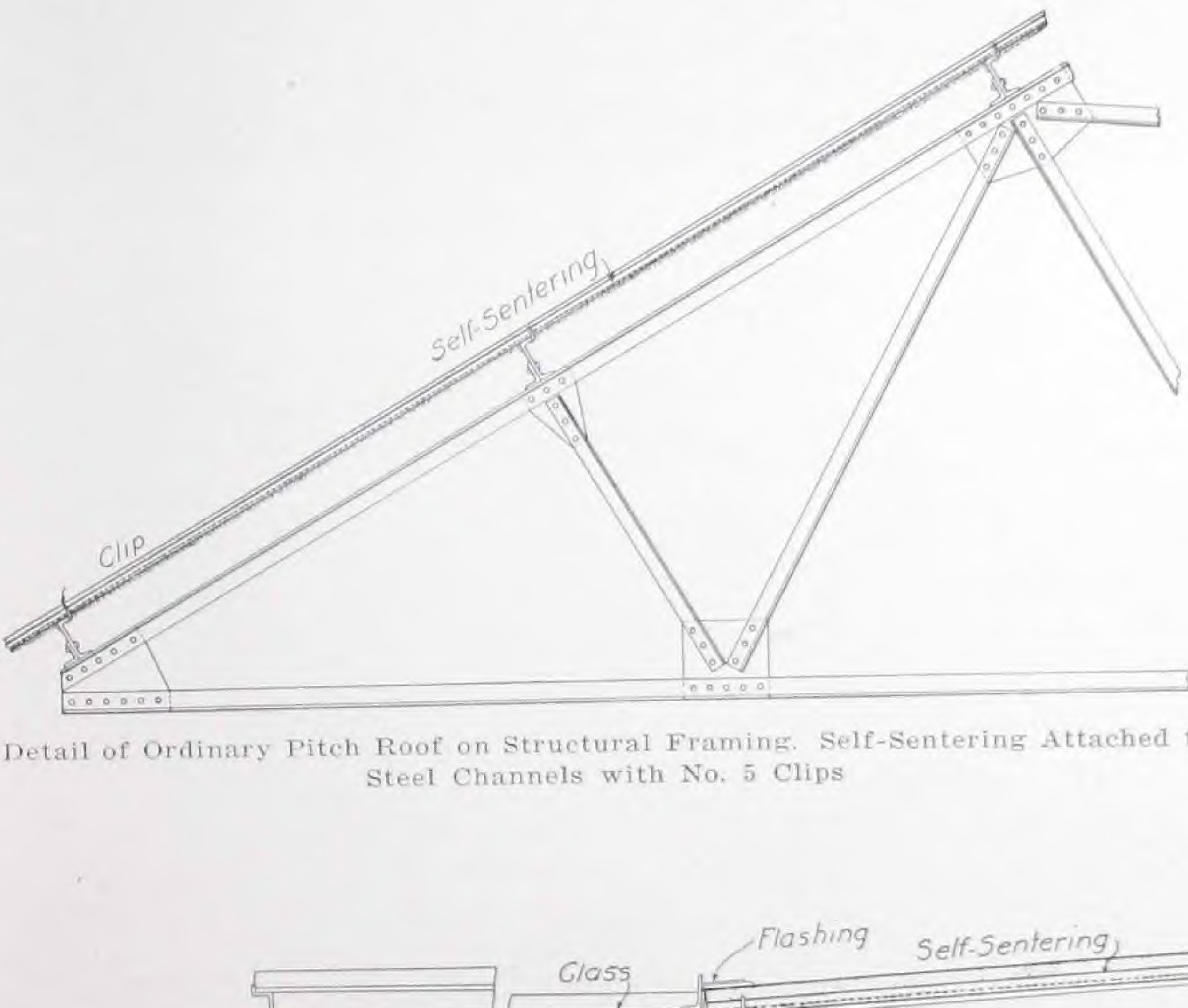
Self-Sentering allows such a diversity of roof construction that it has considerable architectural value and as a result it is being used on buildings where concrete roofs were formerly never even considered. For complete specifications, see pages 32 and 33.

Self-Sentering Roof in Course of Erection on Washington Theatre, Detroit, Mich.
Architect, A. W. Johnson, New York City

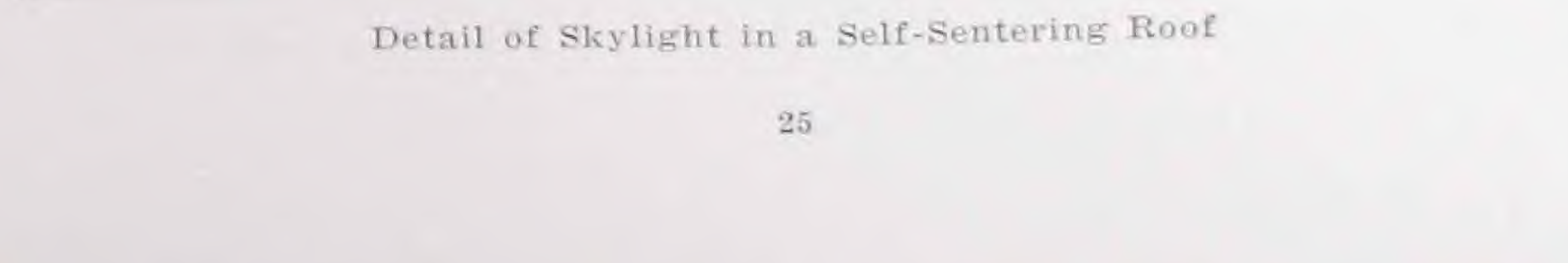
Self-Sentering Roof on O. & W. R. R. Machine Shop at Argo, Washington



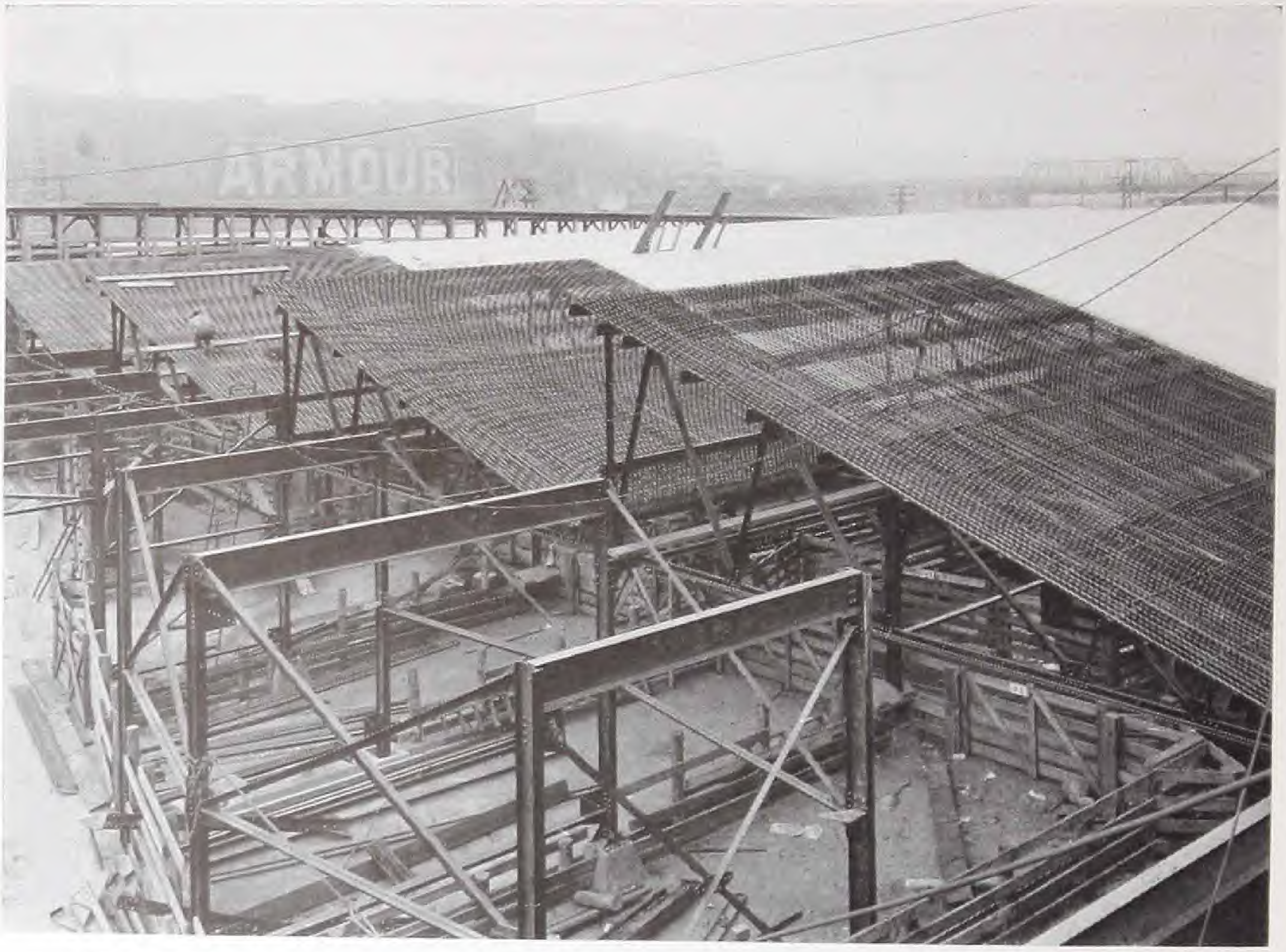
Detail at Eaves of Flat Self-Sentering Roof. Side Walls also Reinforced with Self-Sentering



Detail of Ordinary Pitch Roof on Structural Framing. Self-Sentering Attached to Steel Channels with No. 5 Clips

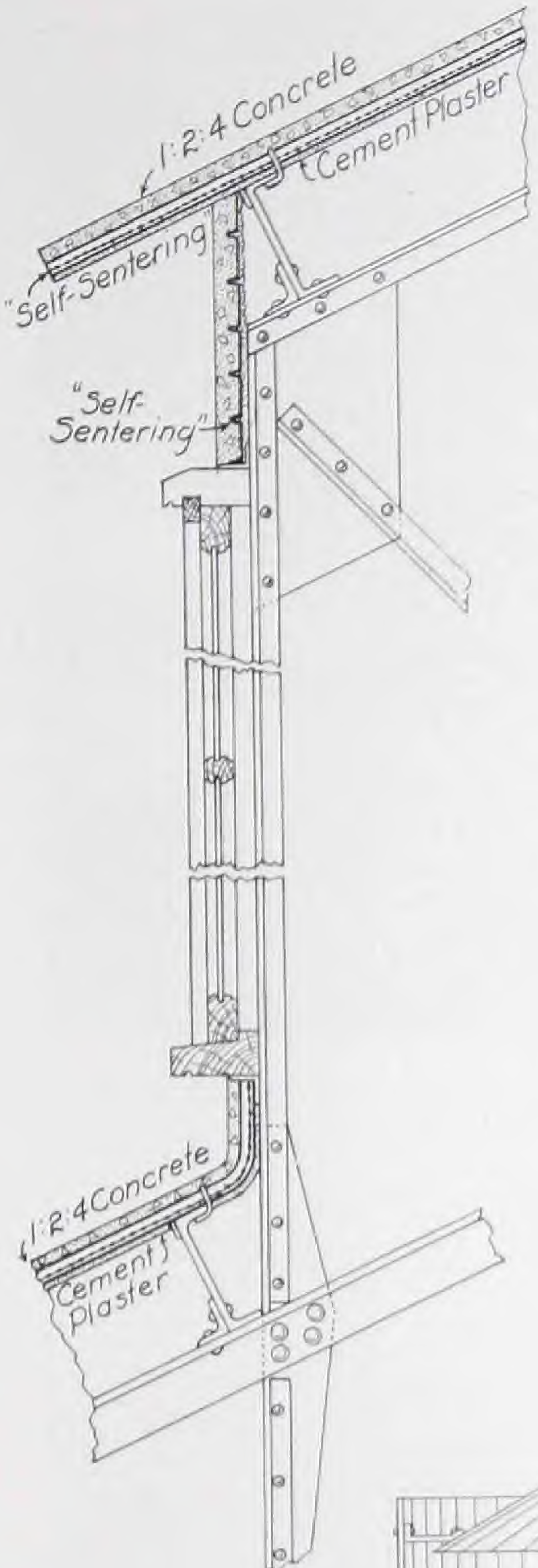


Detail of Skylight in a Self-Sentering Roof



Self-Sentering Saw-tooth Roof, Union Stock Yards, S. Omaha, Nebr.

Self-Sentering Roof for Hog Sheds, Union Stock Yards, S. Omaha, Nebr.

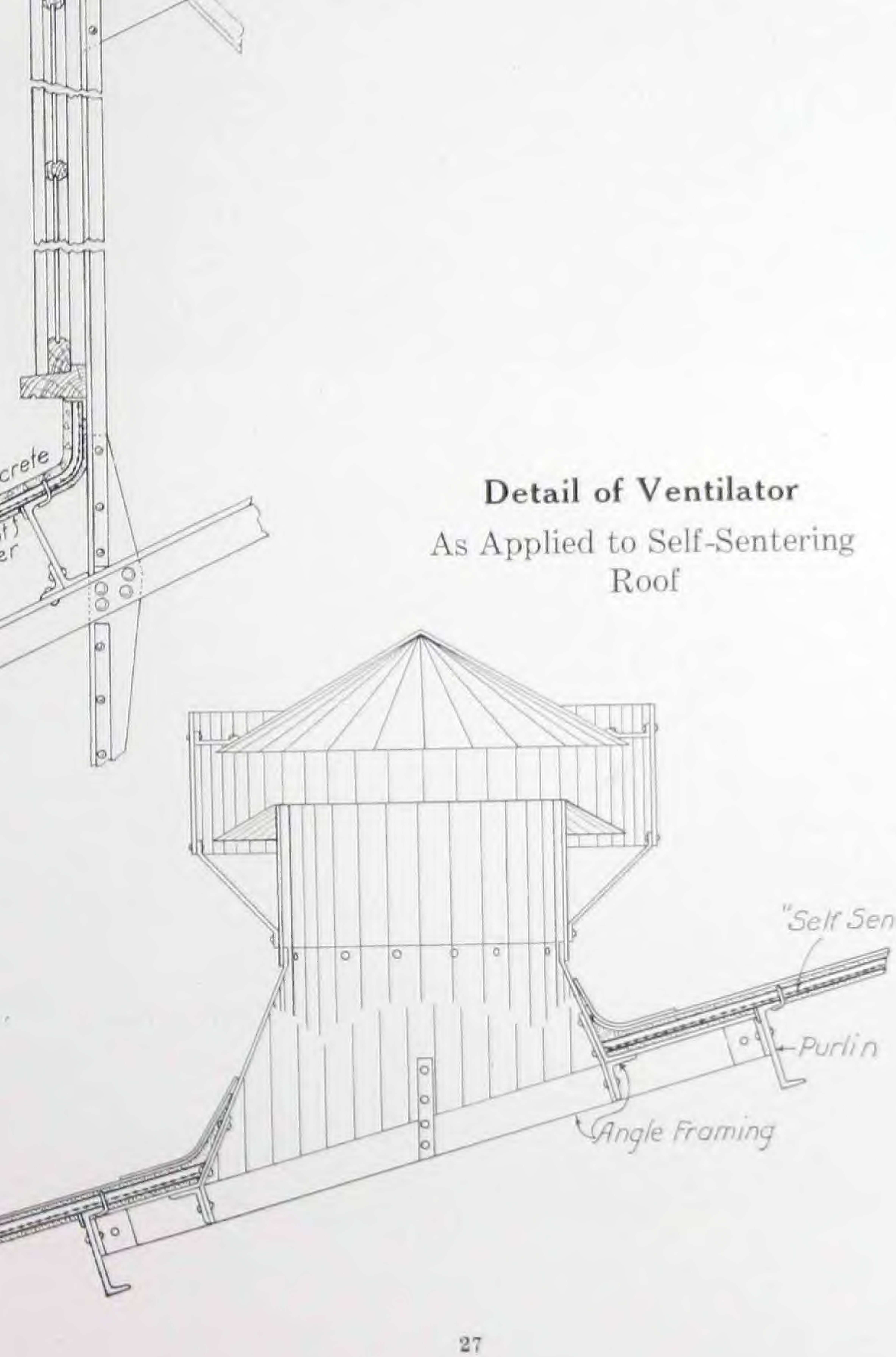


Monitor Roofs

Self-Sentering Used for Both Roof and Walls

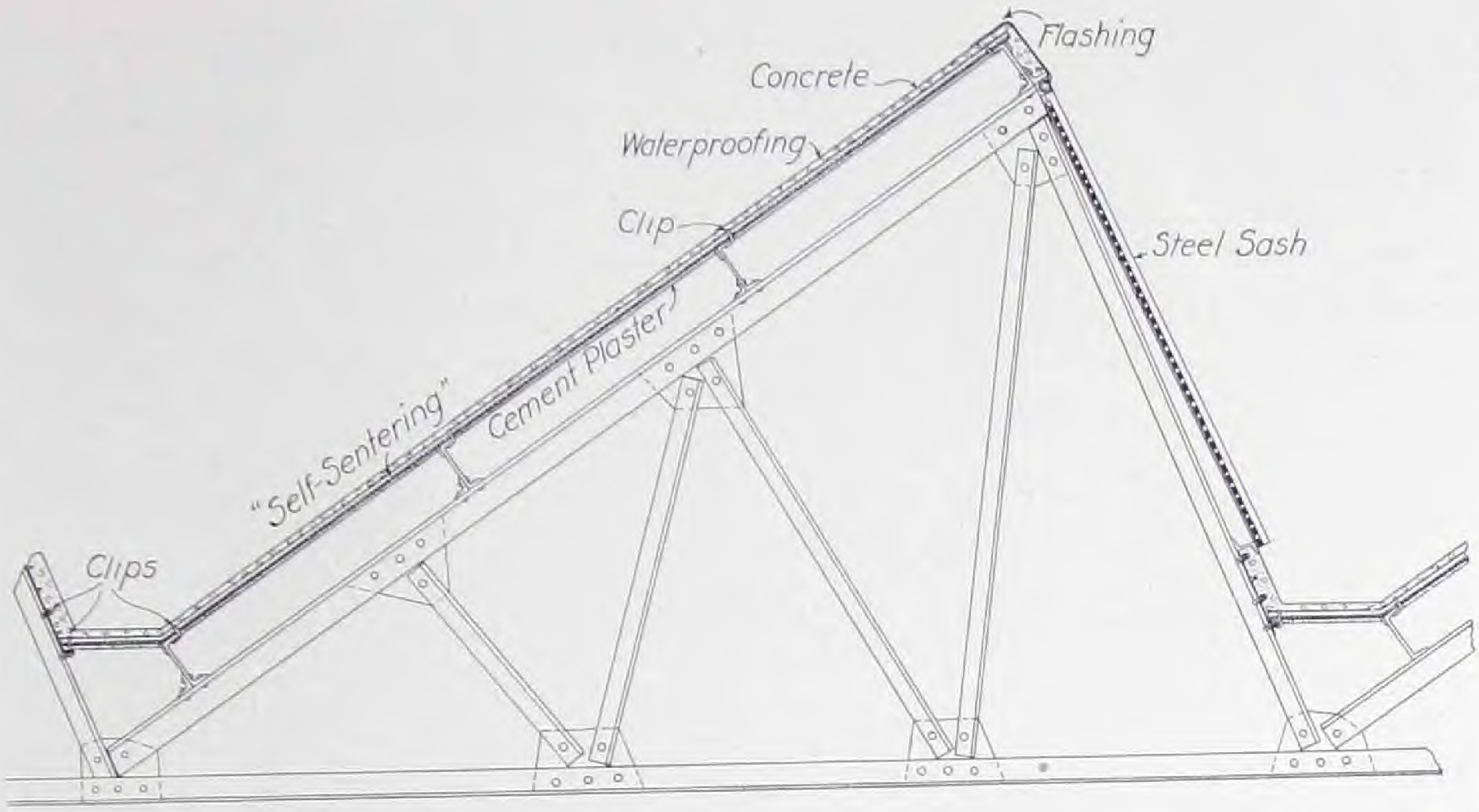
Detail of Ventilator

As Applied to Self-Sentering Roof

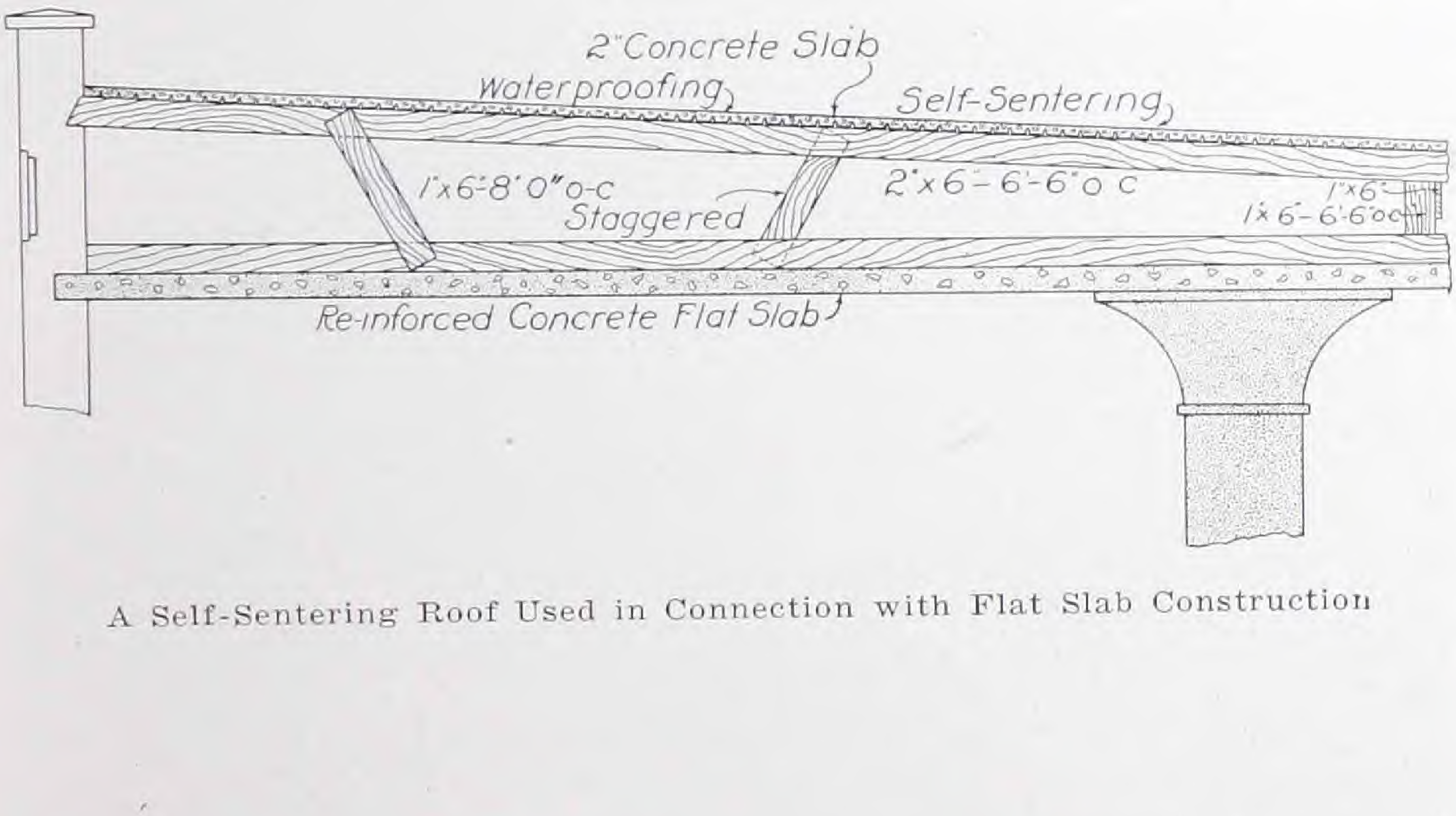


Saw-tooth Roof Seaboard Air Line R. R. Machine Shop at Savannah, Ga.
Fairbanks, Morse & Co., Contractors

50,000 sq. ft. Self-Sentering Roof for Fairbanks, Morse & Company,
Beloit, Wis.



Detail of Self-Sentering Saw-tooth Roof



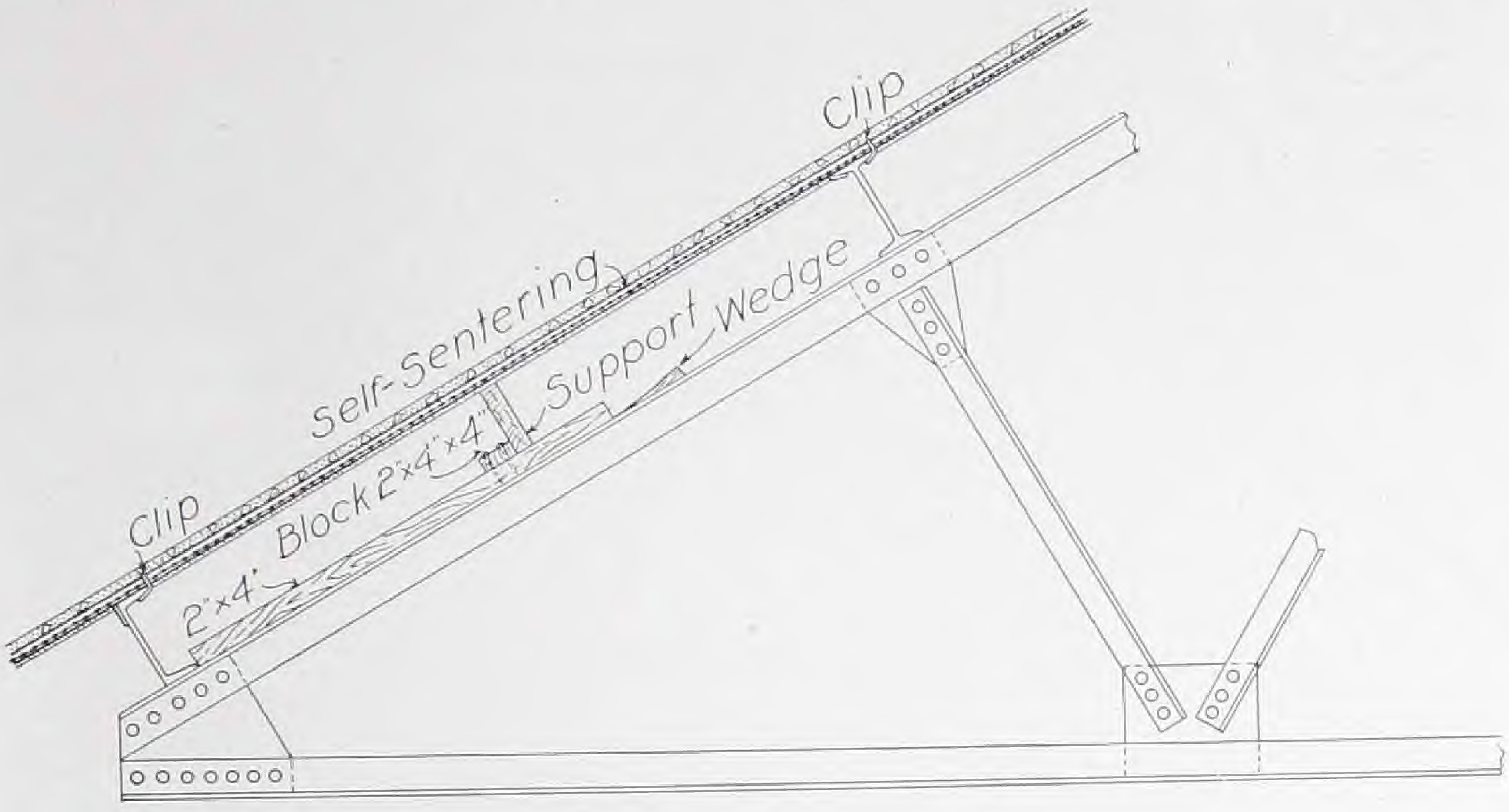
A Self-Sentering Roof Used in Connection with Flat Slab Construction

The type of roof shown in the lower detail is used in reinforced concrete construction of the flat slab type. Where ordinarily a cinder fill is used to obtain the necessary pitch, the Self-Sentering work is built up to the desired pitch on a wood framing. In a large roof this eliminates many complications resulting from the uneven loading of the roof by cinder fill formerly used.

Extreme Simplicity of Erecting Temporary Supports on Long Spans

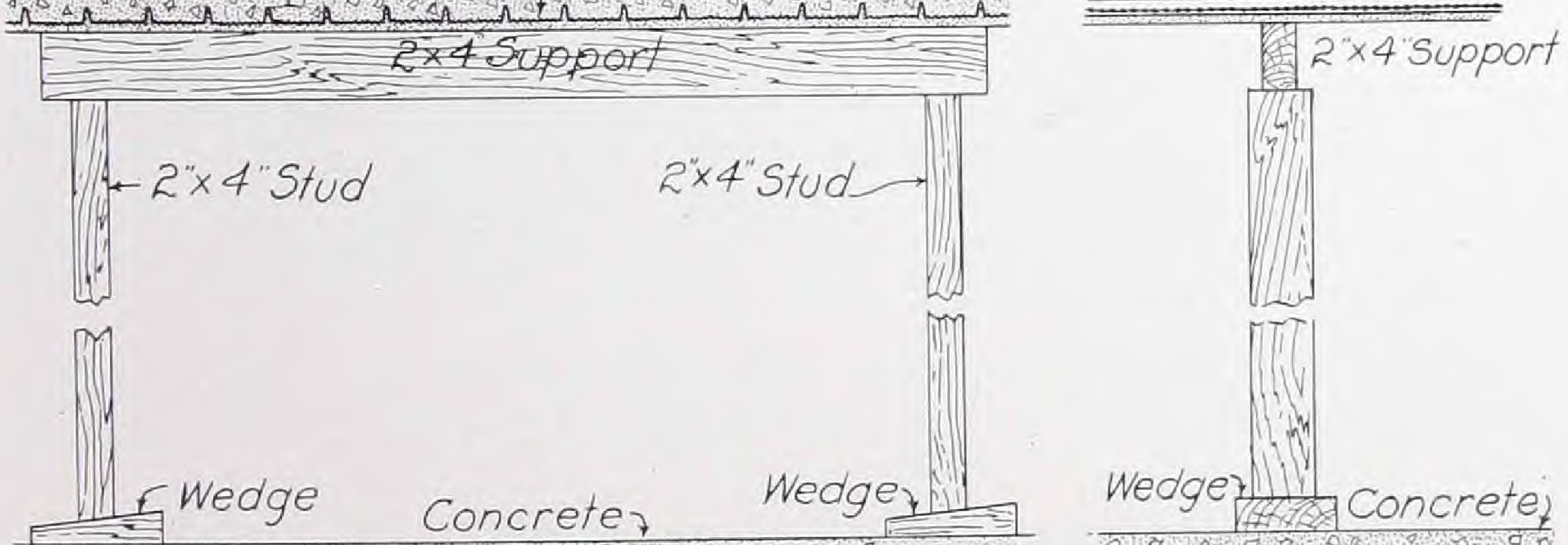
Underside of Roof before Plastering, Aluminum Castings Co., Cleveland, O.

Methods of Erecting Temporary Supports Required on Long Spans



Temporary Supports on a Pitched Roof

If spans between trusses are too long to be spanned by 2x4-inch support shown, intermediate supports may be placed between purlins, resting on the lower flanges or supported by wires as shown on opposite page



Temporary Supports on Flat Roof

This method of erecting supports, where story height is not too great, will often be found simpler and more economical to erect than by attaching supports to purlins and trusses

Self-Sentering Roof on Stock Yards Inn, Chicago, Ill. Underside Plastered With Cement Gun. Architect, R. S. Lindstrom

Roof and Floor Specifications

Self-Sentering, with heavy ribs $3\frac{5}{8}$ inches center to center (manufactured by The General Fireproofing Co., Youngstown, Ohio), to be used on all concrete roofs and floors as indicated on plans.

The Self-Sentering to be rigidly attached to supporting members by special clips supplied by the manufacturer or by tie wire (No. 14 gauge preferred).

(Note: See Safe Load Tables for gauge of Self-Sentering and thickness of slab for various spacing of supports.)

The clips or tie wire, securing the Self-Sentering to the supports, to be spaced not more than $7\frac{1}{4}$ inches apart, i. e., one clip at every other rib at each bearing point and clamped so that the Self-Sentering is firmly held in place.

The side ribs of Self-Sentering sheets to interlock and be securely fastened together by clinching with a special punch; the ends to lap at least 2 inches where lap comes over support and not less than 8 inches if laps occur between supports. Where sheets lap between supports, ends of adjoining sheets to be securely fastened together by punching or wiring.

(Note: Sheets may often be fastened together on the ground, by clinching the side ribs, rolled up and hoisted into place five or six at a time.)

Concrete

Proper planking to be provided so that the weight of workmen will not be borne by Self-Sentering.

The slab to consist of two coats, one to be applied on top of the Self-Sentering and the other on the bottom.

The upper coat is to be applied first and to consist of a mixture of one part Portland cement, two parts of clean, sharp sand and four parts of fine gravel or crushed stone to pass a ½-inch screen and of a consistency which will permit the concrete to key through the mesh of Self-Sentering without waste by dripping. Top to be floated smooth to receive waterproofing.

(Note: The depth of concrete above the mesh of Self-Sentering to depend upon the thickness of slab required. See Safe Load Tables.)

Concrete batches to be deposited over supports and spread towards center of span.

When the upper coat has thoroughly set, the under coat shall be plastered to a thickness of ½ inch below the Self-Sentering.

This coat consists of a mixture of one part Portland cement (gauged with 1-10 its volume of lime), 2½ parts clean, sharp sand, with the addition of a small amount of hair to assist adhesion.

Expansion Rods

Round rods having a sectional area of .03 square inches, shall be placed 30 inches on centers on top of the heavy ribs and at right angles to them to take up expansion. (Note: The manufacturers of Self-Sentering can furnish a special No. 5 rod .207 inches in diameter for this purpose.)

Waterproofing

(For Roofs.) After the concrete has set an approved brand of waterproofing to be applied. (Full information given in G. F. Waterproofing Handbook.)

With Wood Beams

Where supporting members are of wood, suitable wire staples (1½-inch, No. 10 gauge galvanized with a ¾-inch spread preferred) to be used to secure the Self-Sentering in position. Self-Sentering sheets to be stapled to supports not more than 7¼ inches apart, i. e., one staple to every other rib at each bearing point.

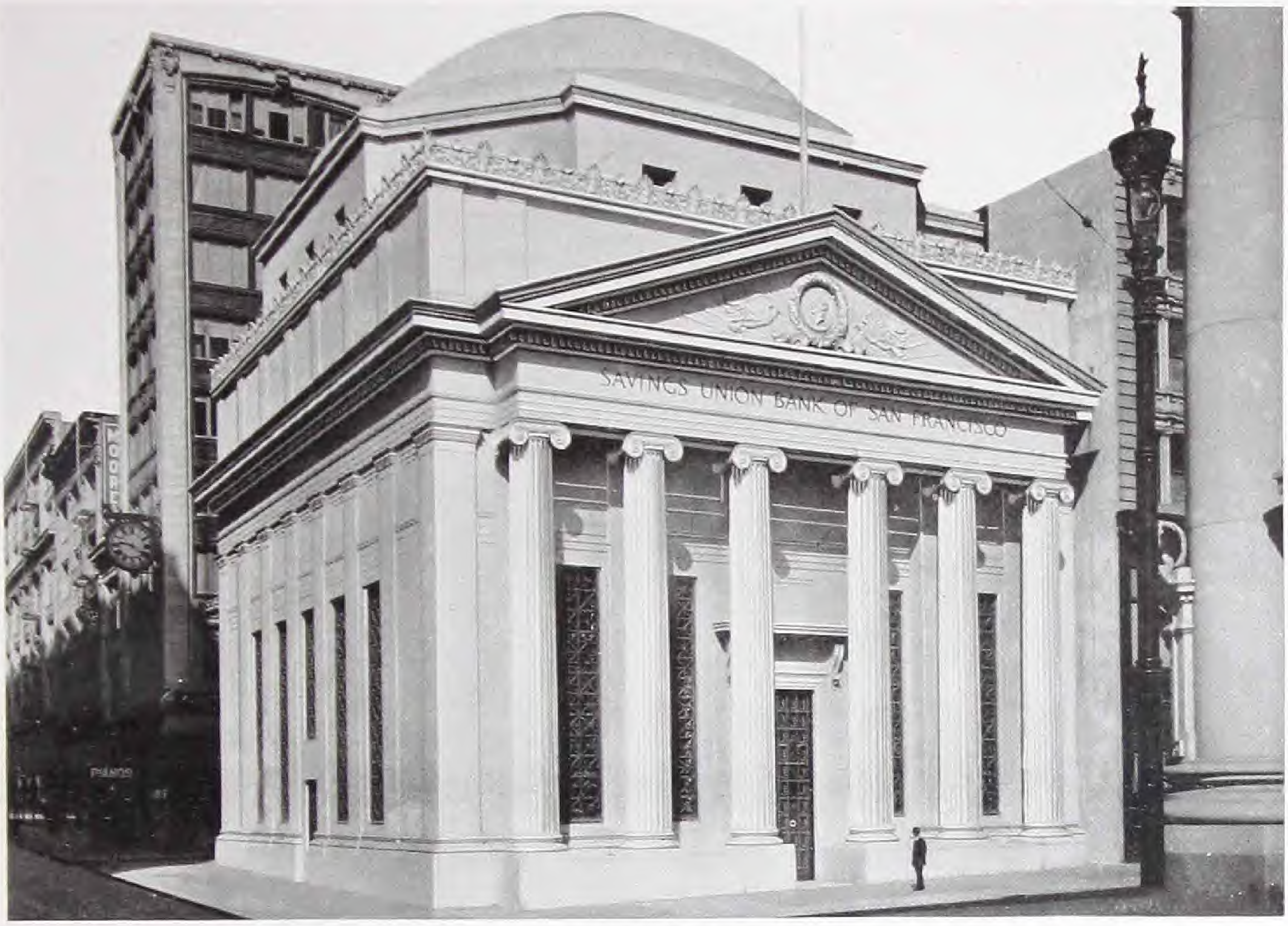
Sheets to be fastened together, concrete applied and underside plastered as on steel construction.

With Concrete Beams

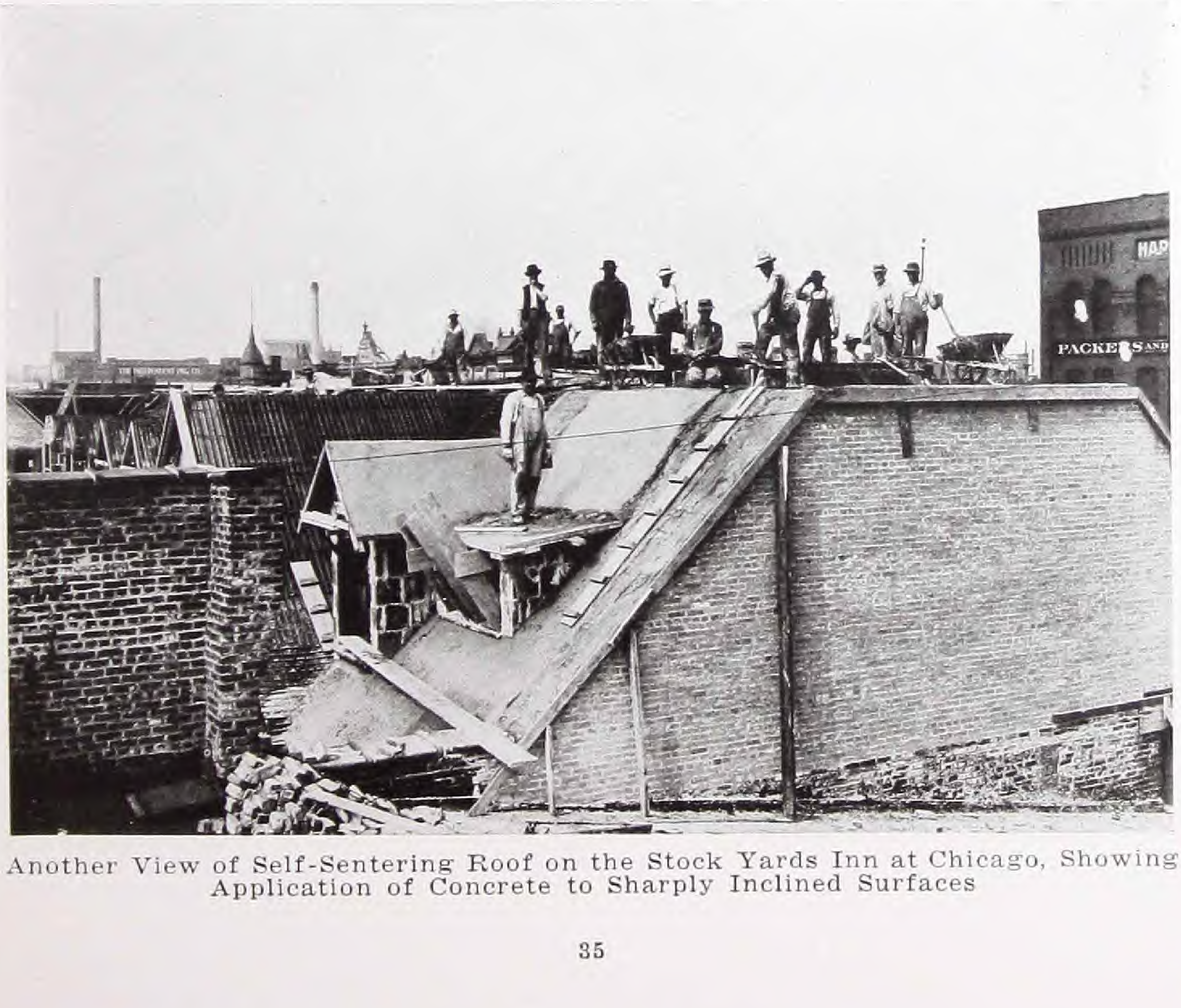
Where concrete beams are used with flat slabs, the ends of the Self-Sentering sheets shall rest on edges of beam boxes; sides of beam boxes may be wired together to save bracing. With arched slabs the ends of the Self-Sentering sheets shall rest on the bottom board of the beam box. In other respects the work shall be performed in the same manner as with structural steel framing.

Self-Sentering Roof on Frost Wire Fence Co. Plant, Cleveland, O.
Architects and Engineers, Prack & Perrine, Toronto, Ont.

Self-Sentering Roof on Underwood Building, San Francisco, Cal.

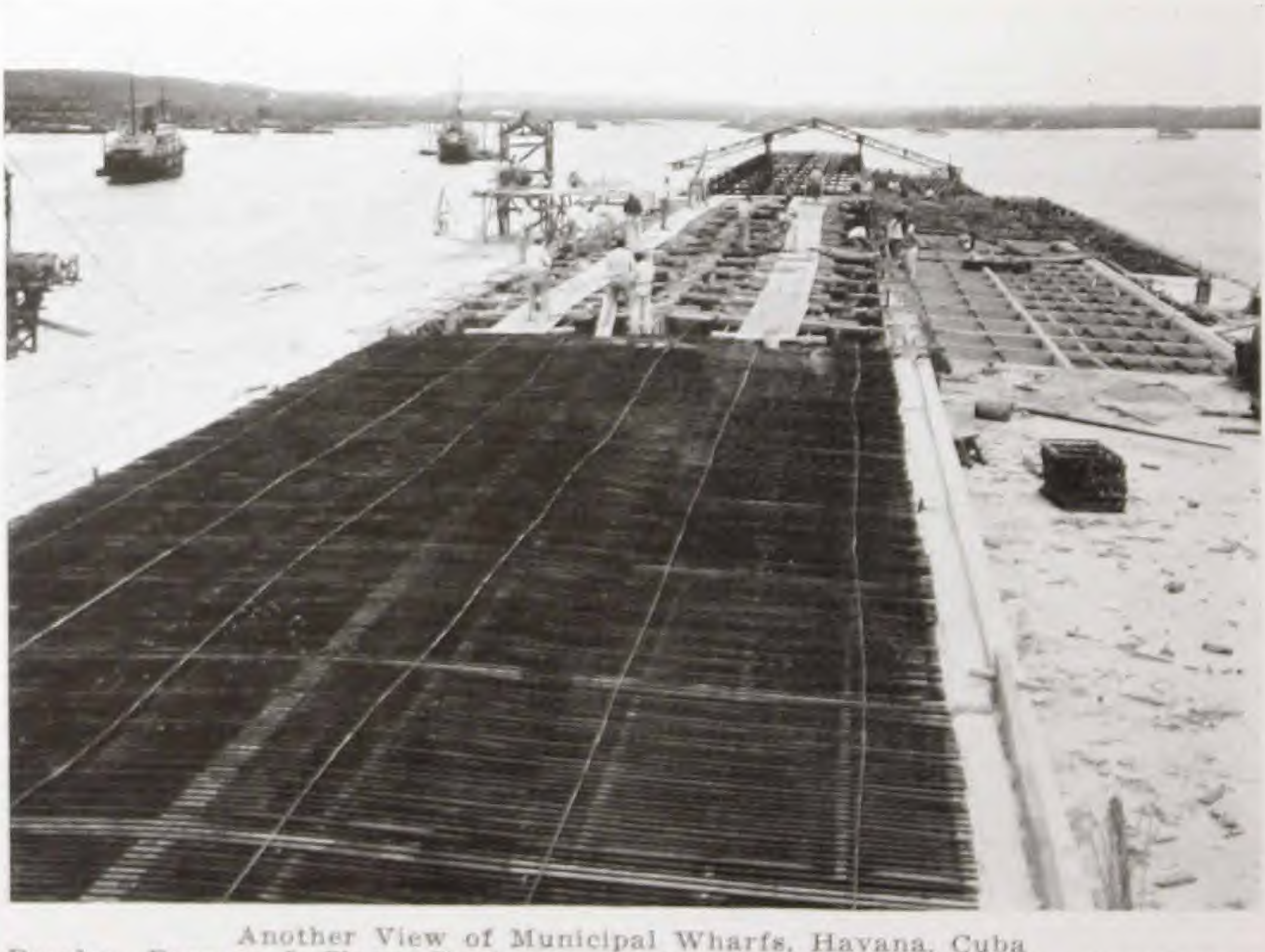


Savings Union Bank & Trust Co., San Francisco, Cal.
Self-Sentering used for Vault Floors
Architects, Bliss & Taville



Another View of Self-Sentering Roof on the Stock Yards Inn at Chicago, Showing Application of Concrete to Sharply Inclined Surfaces

Municipal Wharfs, Havana, Cuba
90,000 ft. Self-Sentering used for Roofs of Pier Sheds



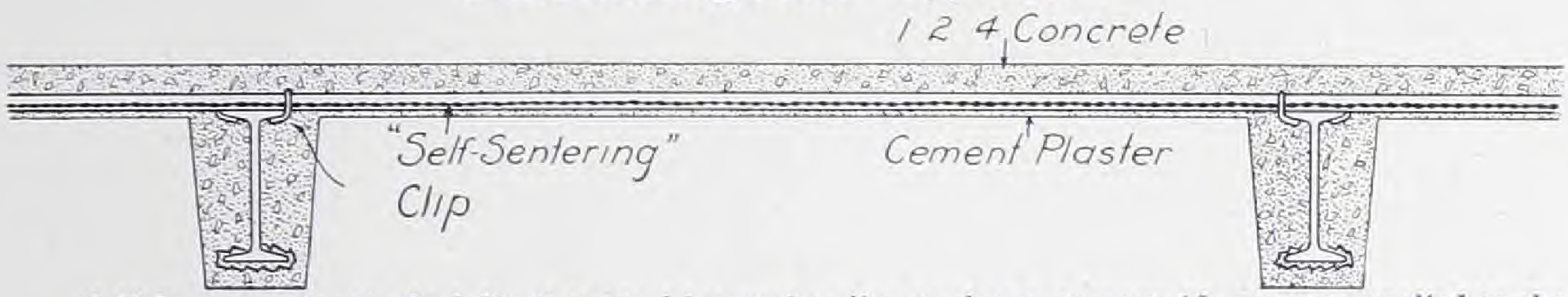
Another View of Municipal Wharfs, Havana, Cuba
Barclay, Parsons & Clapp, Engineers—McArthur, Perks & Co., Ltd., Contractors

Self-Sentering Floors

SELF-SENTERING makes a most economical type of fireproof floor, which can be readily adapted to any type of building. It can be used on wood, steel or concrete beams. The construction is very similar to roof work, except that, of course, it must be heavier to conform to the loads carried. The various types of floors shown herewith have each their individual merits, but they are uniform in certain respects, namely, the economy in erection—due to the absence of form work, their wonderful strength as compared with their light weight, and their absolute permanence, fireproofness and sanitary features.

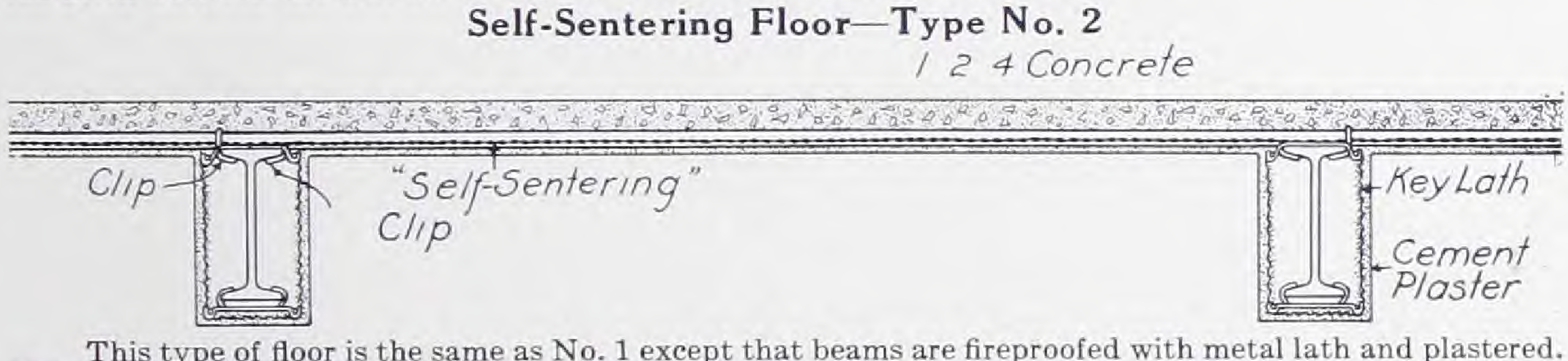
The concrete floor has proved itself the most enduring type and, as in roof work, its only objection has been high cost and excessive weight. Through the advent of Self-Sentering, by means of which the most expensive part of such work—form work—has been eliminated, the cost has been reduced to compare very favorably with any other type. The use of the lighter slabs required by Self-Sentering has cut the weight to a minimum and yet the strength of these floors is unquestioned. There is no danger from failure due to premature removal of forms, as Self-Sentering, acting as both form and reinforcement, is always in place.

Self-Sentering Floor—Type No. 1



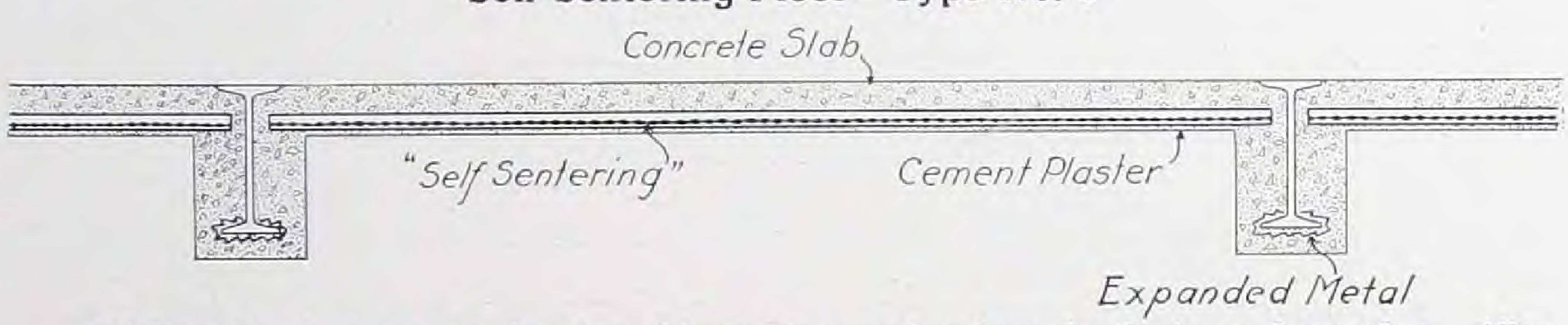
Self-Sentering is attached direct to steel beams by clips as shown on page 10, concrete applied to the desired thickness and the underside plastered with cement mortar. Sides of beam boxes are wired together to save bracing across the span. To permit pouring the beam haunching at the same time, punch out the mesh between the Self-Sentering ribs where they come over the beam.

Self-Sentering Floor—Type No. 2



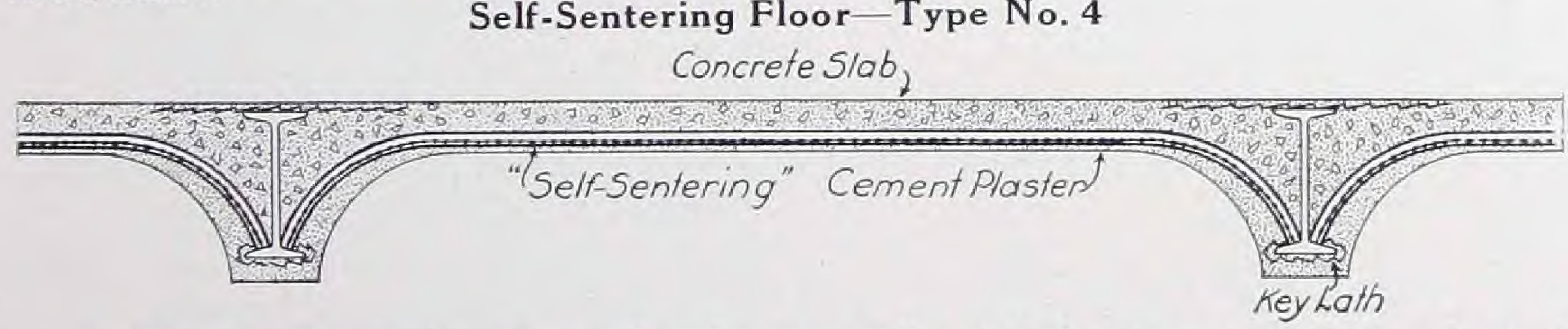
This type of floor is the same as No. 1 except that beams are fireproofed with metal lath and plastered. This can be done at the same time the underside of the slab is plastered.

Self-Sentering Floor—Type No. 3



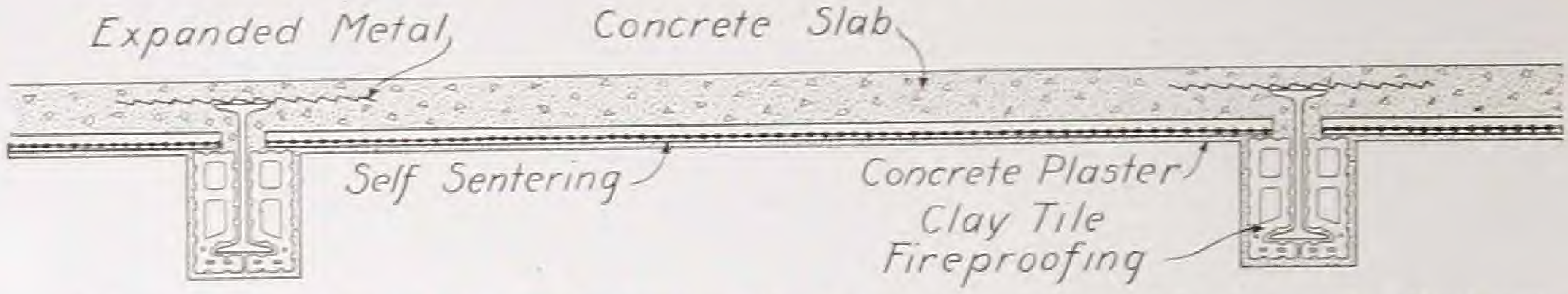
Self-Sentering sheets rest on the edges of beam boxes used as forms for the beam fireproofing. Allow slab to set flush with top of beam, giving greater headroom below. Self-Sentering acts as both form and reinforcement.

Self-Sentering Floor—Type No. 4



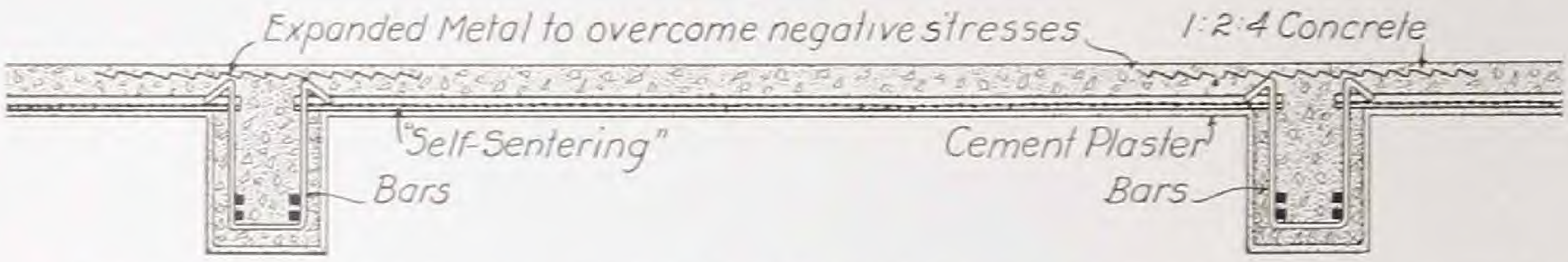
Self-Sentering sheets, with ends curved to the proper radius at the factory, rest on the lower flange of steel beams, acting not only as reinforcing and centering for the slab, but as a form for the fireproofing of the sides of the beam. The bottom of the beam is wrapped with expanded metal lath and plastered at the same time as the underside of the slab. By using Style "H" Expanded Metal (sectional area .265 square inches per foot of width) over the supports as shown, this slab will carry approximately 25% more than shown by table on page 10.

Self-Sentering Floor—Type No. 6



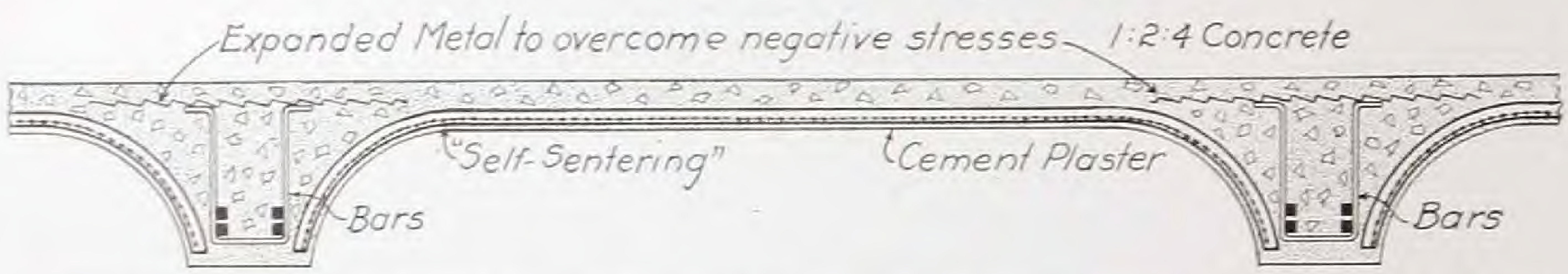
This type of floor is the same as No. 3 except that terra cotta tile is used for fireproofing the beams. This saves the cost of beam boxes on occasions where the cost would be prohibitive.

Self-Sentering Floor—Type No. 7



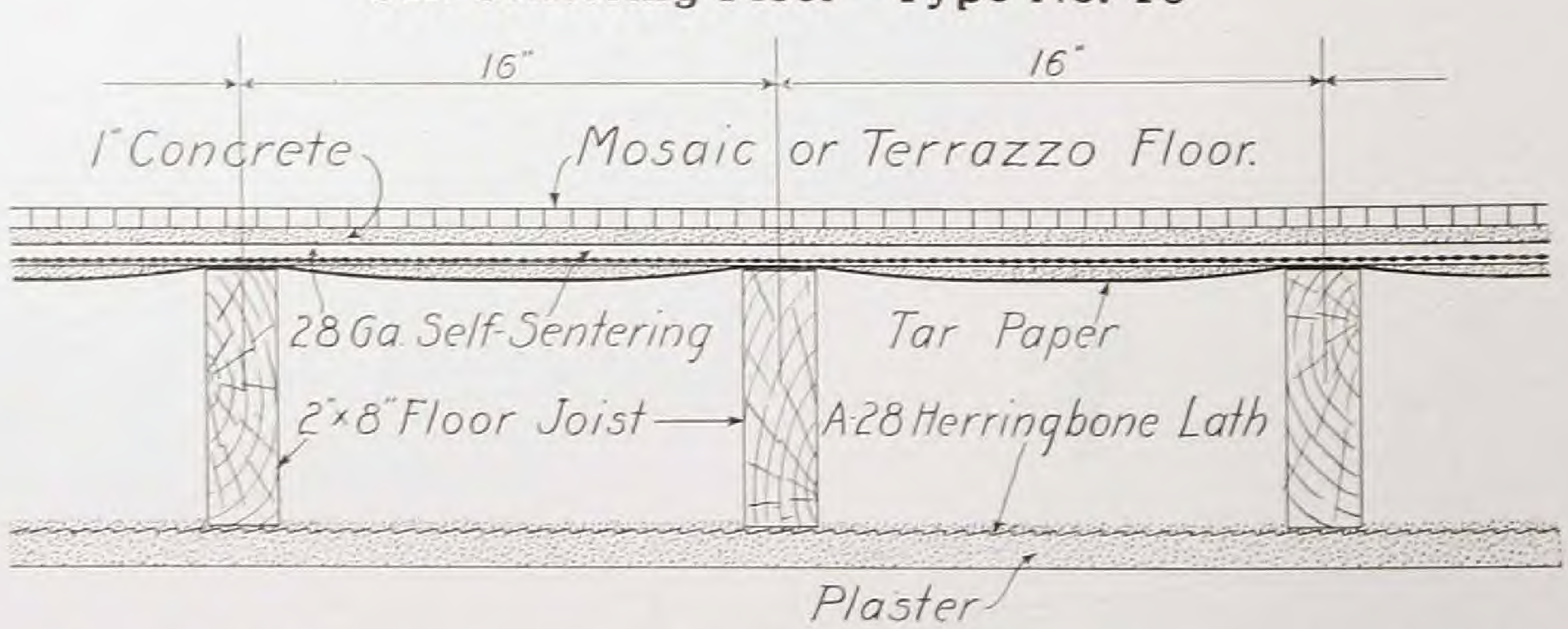
Self-Sentering sheets are supported by sides of beam boxes and concrete applied to the necessary thickness at the same time beams are poured. Underside to be plastered after beam boxes are removed. Self-Sentering acts as both form and reinforcement. By using Style "H" Expanded Metal (sectional area .265 square inches per foot of width) over the supports as shown, this slab will carry approximately 25% more than shown by table on page 10.

Self-Sentering Floor—Type No. 8



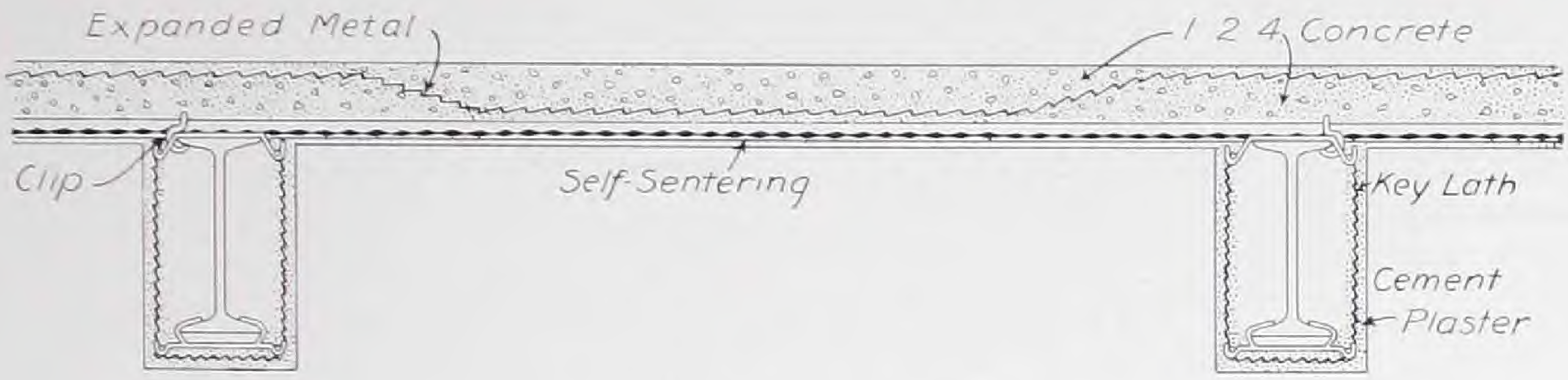
Self-Sentering sheets, curved at ends to exact radius required, are placed with ends resting on bottom board of beam boxes, acting not only as form and reinforcing for the slab but also as form for the sides of the concrete beam. By using Style "H" Expanded Metal (sectional area .265 square inches per foot of width) over the supports as shown, this slab will carry approximately 25% more than shown by table on page 10.

Self-Sentering Floor—Type No. 10



In this type of construction Self-Sentering is placed over building paper direct on wood joists and forms the base for a 1½-inch cement coat to hold terrazzo, mosaic or tile floors. This gives a reinforced concrete slab which absolutely prevents the cracks so common to the old method of doing this work.

Self-Sentering Floor—Type No. 11



Where extra heavy loads are required and an arched floor is not desirable, additional reinforcement in the form of expanded metal may be added, and the table below shows safe live loads carried by the use of our Style "G" Expanded Metal (sectional area .176 sq. in.)

Stress in steel, 16,000 pounds per square inch. N=15.

Expanded metal to be in top of slab over supports and bent as shown.

Where laps occur they are to be at least 8 inches long and to cccur as near the point of bend as possible.

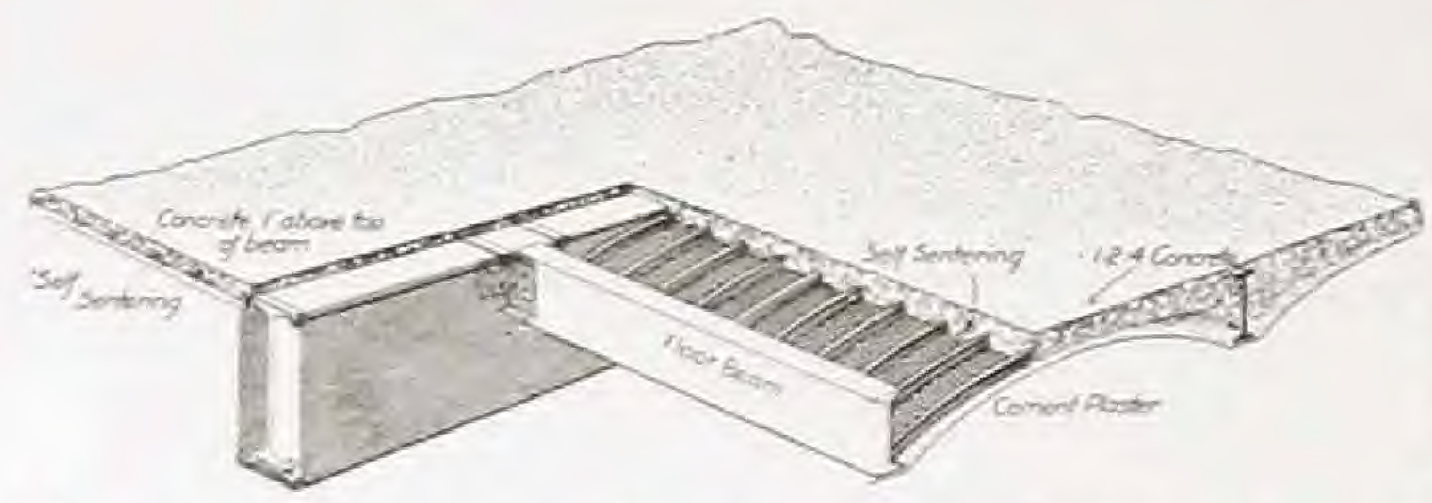
These tables are based on Style "G"—weighing .6 pounds per sq. ft., sectional area per foot of width .176 square inches. Bars or wire cloth having same sectional area may be substituted.

Resisting moments include reasonable allowance for increase due to negative reinforcement.

Gauge of Self-Sentering and Style of Expanded Metal	Thickness of Slab Above Bottom of Mesh	f c*	Resisting Moment Per Foot of Width in Inch Pounds	SPAN						
				6 ft.	7 ft.	8 ft.	9 ft.	10 ft.	11 ft.	12 ft.
26 + "G"	3½"	800	20800	334	232	166	121	88		
24 + "G"		800	21400	350	242	174	127	93		
26 + "G"	4"	725	24200	394	275	208	144	106		
24 + "G"		800	23600	454	319	231	171	127	96	71
26 + "G"	4½"	675	27700	451	315	226	165	122	90	
24 + "G"		750	31400	500	365	264	196	147	110	82
26 + "G"	5"	610	31200	500	356	257	188	139	103	75
24 + "G"		690	35400		412	300	222	167	125	94
26 + "G"	5½"	575	34600		400	287	211	156	116	85
24 + "G"		640	39300		459	333	248	187	141	106
26 + "G"	6"	550	38160		438	317	233	173	129	95
24 + "G"		610	43290		500	371	276	208	158	121

*f c—maximum extreme fiber stress in concrete.

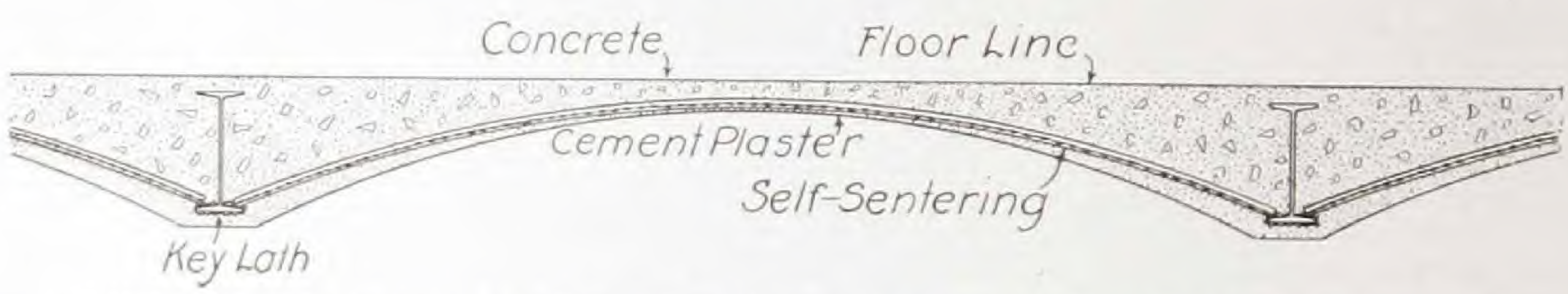
Arched Floors



FOR extra heavy loads, Self-Sentering permits of a very economical application of the arched slab. The sheets are curved at our factory, at a slight charge, to any desired radius and they are as easily and quickly applied as in flat slab work. Note the saving in form work—and every builder recognizes the expense of curved centering—not only in the slab itself, but, where used with concrete beams, only the bottom boards for beam boxes are required.

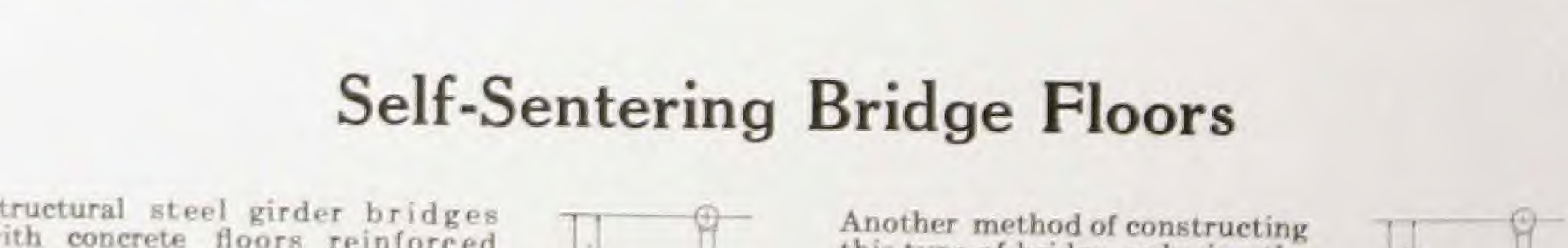
If there are any details for floor work which are not made clear here, our Engineering Department will be glad to work them out for you on request.

Self-Sentering Floor—Type No. 5



Self-Sentering sheets, curved to the proper radius in our factory, are placed with ends resting on lower flanges of beams. This makes the strongest type of floor and can be readily used on spans up to 12 feet. The lower flange of beam is wrapped with expanded metal lath and plastered at the same time as the underside of the slab.

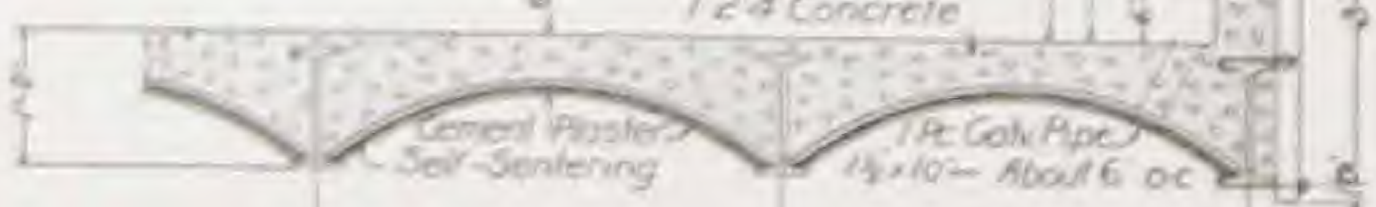
Self-Sentering Floor—Type No. 9



Suitable for extra heavy loads. Self-Sentering sheets, curved in our factory to the necessary radius, are used in the same manner as Type No. 8. The Self-Sentering acts as both form and reinforcement for the slab and forms for the side of the concrete beam.

Self-Sentering Bridge Floors

Structural steel girder bridges with concrete floors reinforced with Self-Sentering. No form work required and arched slabs give ample strength for all loads.



Another method of constructing this type of bridge, reducing the rise of the arch and the amount of material required.

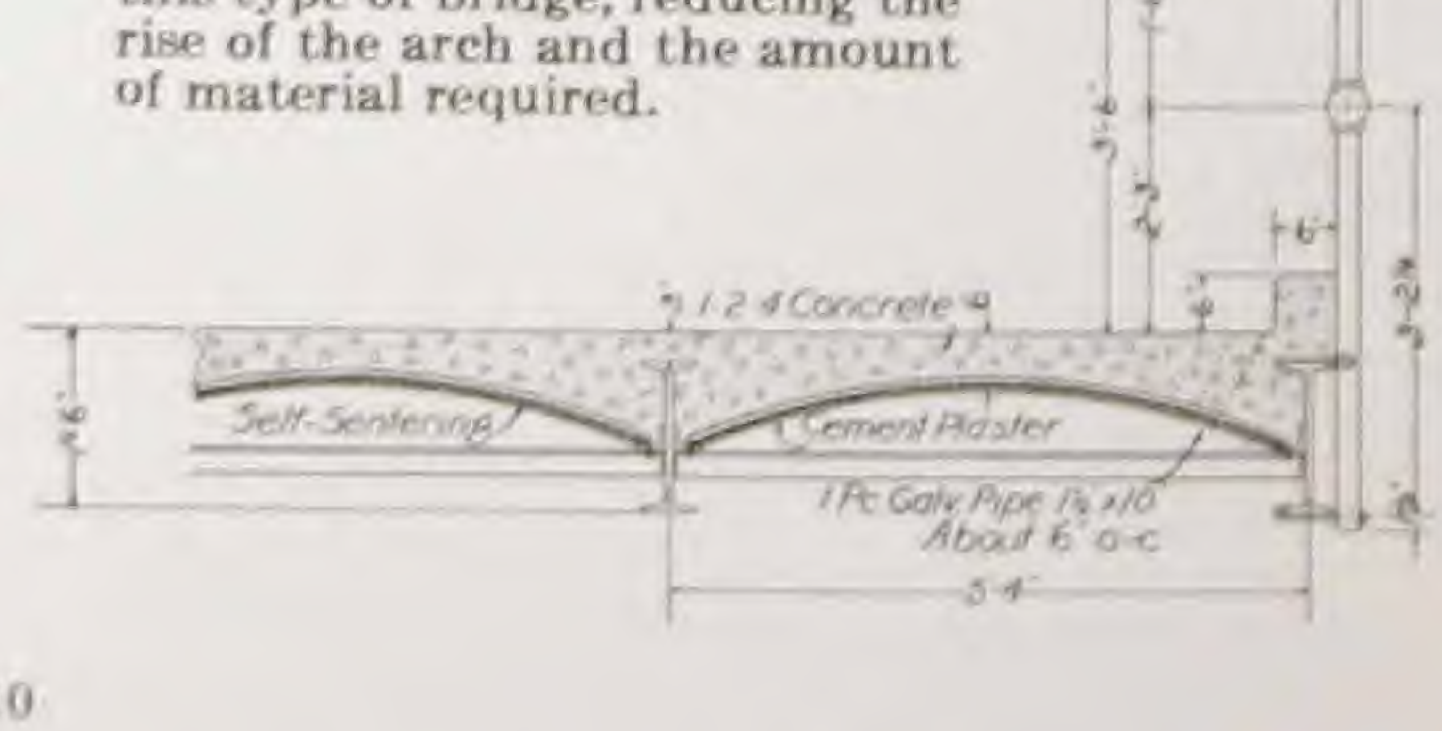
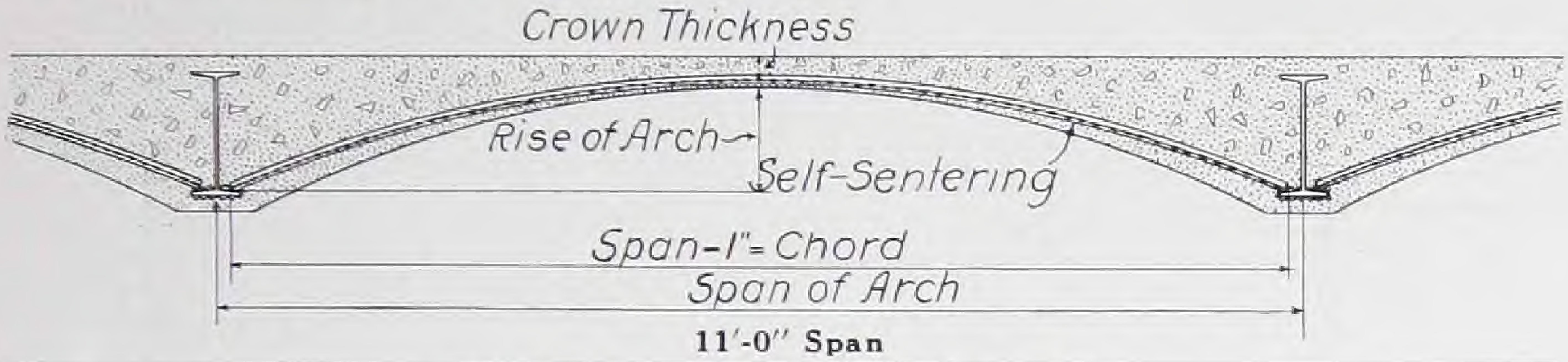


Table 7

Tables showing crown thickness required for various loads on stone and cinder concrete arches reinforced with Self-Sentering—No. 24 Gauge.



11′-0″ Span

Rise in Inches	LIVE LOADS IN POUNDS PER SQ. FT.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
12	5″	6½″	4″	5″	3½″	4″	3″	3¾″	11′-2″
15	4″	4¾″	3½″	3¾″	3″	3½″	3″	3″	11′-4″
18	3½″	3¾″	3″	3¼″	3″	3″	3″	3″	11′-6″
21	3″	3½″	3″	3″	3″	3″	3″	3″	11′-8½″
24	3″	3½″	3″	3″	3″	3″	3″	3″	11′-11″

10′-0″ Span

Rise in Inches	LIVE LOADS IN POUNDS PER SQ. FT.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
12	4½″	5½″	4″	4¼″	3½″	3¾″	3″	3¼″	10′-2½″
15	3½″	4″	3″	3½″	3″	3″	3″	3″	10′-4½″
18	3″	3½″	3″	3″	3″	3″	3″	3″	10′-6¾″
21	3″	3″	3″	3″	3″	3″	3″	3″	10′-9½″
24	3″	3″	3″	3″	3″	3″	3″	3″	11′-0″

9′-0″ Span

Rise in Inches	LIVE LOADS IN POUNDS PER SQ. FT.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
12	3″	5″	3″	4¼″	3″	3½″	3″	3″	9′- 3″
15	3″	4″	3″	3½″	3″	3″	3″	3″	9′- 5″
18	3″	3¼″	3″	3″	3″	3″	3″	3″	9′- 7½″
21	3″	3″	3″	3″	3″	3″	3″	3″	9′-10½″
24	3″	3″	3″	3″	3″	3″	3″	3″	10′- 1½″

8′-0″ Span

Rise in Inches	LIVE LOADS IN POUNDS PER SQ. FT.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
9	3″	5″	3″	4″	3″	3½″	3″	3″	8′-1½″
12	3″	4¼″	3″	4″	3″	3″	3″	3″	8′-3½″
15	3″	3¾″	3″	3½″	3″	3″	3″	3″	8′-5¾″
18	3″	3″	3″	3″	3″	3″	3″	3″	8′-8½″
21	3″	3″	3″	3″	3″	3″	3″	3″	8′-11¾″
24	3″	3″	3″	3″	3″	3″	3″	3″	9′-3½″

7′-0″ Span

Rise in Inches	LIVE LOADS IN POUNDS PER SQ. FT.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
9	3″	5″	3″	3¾″	3″	3¼″	3″	3″	7′-2″
12	3″	4″	3″	3½″	3″	3″	3″	3″	7′-4″
15	3″	3½″	3″	3″	3″	3″	3″	3″	7′-6¾″
18	3″	3″	3″	3″	3″	3″	3″	3″	7′-9¾″
21	3″	3″	3″	3″	3″	3″	3″	3″	8′-1½″
24	3″	3″	3″	3″	3″	3″	3″	3″	8′-5½″

6′-0″ Span

Rise in Inches	LIVE LOADS IN POUNDS PER SQ. FT.								Length of Sheet
	300		200		150		100		
	Stone	Cinder	Stone	Cinder	Stone	Cinder	Stone	Cinder	
9	3″	4½″	3″	3½″	3″	3″	3″	3″	6′-2″
12	3″	3½″	3″	3½″	3″	3″	3″	3″	6′-4½″
15	3″	3″	3″	3″	3″	3″	3″	3″	6′-7½″
18	3″	3″	3″	3″	3″	3″	3″	3″	6′-11″
21	3″	3″	3″	3″	3″	3″	3″	3″	7′-3″
24	3″	3″	3″	3″	3″	3″	3″	3″	7′-7½″

Table No. 8

Showing weight per square foot of stone concrete arches averaged over entire span.

12′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	138	132	126	120	114	108	102	96	90	84
15″	150	144	138	132	126	120	114	108	102	96
18″	161	155	149	143	137	131	125	119	113	107
21″	175	169	163	157	151	145	139	133	127	121
24″	194	188	182	176	170	164	158	152	146	140

11′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	140	134	128	122	116	110	104	98	92	86
15″	149	143	137	131	125	119	113	107	101	95
18″	161	155	149	143	137	131	125	119	113	107
21″	172	166	160	154	148	142	136	130	124	118
24″	183	177	171	165	159	153	147	141	135	129

10′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	140	134	128	122	116	110	104	98	92	86
15″	149	143	137	131	125	119	113	107	101	95
18″	161	155	149	143	137	131	125	119	113	107
21″	171	165	159	153	147	141	135	129	123	117
24″	180	174	168	162	156	150	144	138	132	126

9′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	138	132	126	120	114	108	102	96	90	84
15″	149	143	137	131	125	119	113	107	101	95
18″	160	154	148	142	136	130	124	118	112	106
21″	171	165	159	153	147	141	135	129	123	117
24″	180	174	168	162	156	150	144	138	132	126

8′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
9″	127	121	115	109	103	97	91	85	79	73
12″	138	132	126	120	114	108	102	96	90	84
15″	149	143	137	131	125	119	113	107	101	95
18″	159	153	147	141	135	129	123	117	111	105
21″	170	164	158	152	146	140	134	128	122	116
24″	179	173	167	161	155	149	143	137	131	125

7′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
9″	126	120	114	108	102	96	90	84	78	72
12″	138	132	126	120	114	108	102	96	90	84
15″	149	143	137	131	125	119	113	107	101	95
18″	159	153	147	141	135	129	123	117	111	105
21″	168	162	156	150	144	138	132	126	120	114
24″	177	171	165	159	153	147	141	135	129	123

Table No. 9

Showing weight per square foot of cinder concrete arches averaged over entire span.

12′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	86	83	79	75	71	68	64	60	56	53
15″	94	90	86	83	79	75	71	68	64	60
18″	101	97	93	89	86	82	78	74	71	67
21″	109	106	102	98	94	91	87	83	79	76
24″	121	118	114	110	106	103	99	95	191	88

11′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	87	84	80	76	73	69	65	61	58	54
15″	93	89	86	82	78	74	71	67	63	59
18″	101	97	93	89	86	82	78	74	71	67
21″	108	104	100	96	93	89	85	81	78	74
24″	114	111	107	103	99	96	92	88	84	81

10′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	87	84	80	76	73	69	65	61	58	54
15″	93	89	86	82	78	74	71	67	63	59
18″	101	97	93	89	86	82	78	74	71	67
21″	107	103	99	96	92	88	84	81	77	73
24″	113	109	105	102	98	94	90	87	83	79

9′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
12″	86	83	79	75	71	68	64	60	56	53
15″	93	89	86	82	78	74	71	67	63	59
18″	100	96	93	89	85	81	78	74	70	66
21″	107	103	99	96	92	88	84	81	77	73
24″	112	108	105	101	97	93	90	86	82	78

8′-0″ Span

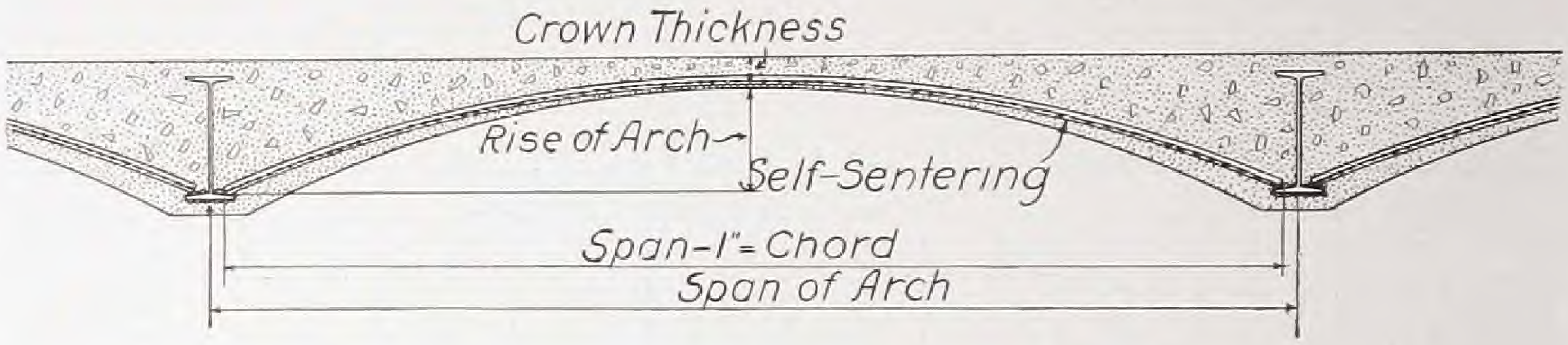
Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
9″	79	76	72	68	64	61	57	53	49	46
12″	86	83	79	75	71	68	64	60	56	53
15″	93	89	86	82	78	74	71	67	63	59
18″	99	96	92	88	84	81	77	73	69	66
21″	106	103	99	95	91	88	84	80	76	73
24″	112	108	104	101	97	93	89	86	82	78

7′-0″ Span

Rise	THICKNESS OF SLAB AT CROWN OF ARCH									
	7½″	7″	6½″	6″	5½″	5″	4½″	4″	3½″	3″
9″	79	75	71	68	64	60	56	52	49	45
12″	86	83	79	75	71	68	64	60	56	53
15″	93	89	86	82	78	74	71	67	63	59
18″	99	96	92	88	84	81	77	73	69	66
21″	105	101	98	94	90	86	83	79	75	71
24″	111	107	103	99	96	92	88	84	81	77

Table No. 10

Showing method of computing lengths of curved Self-Sentering.

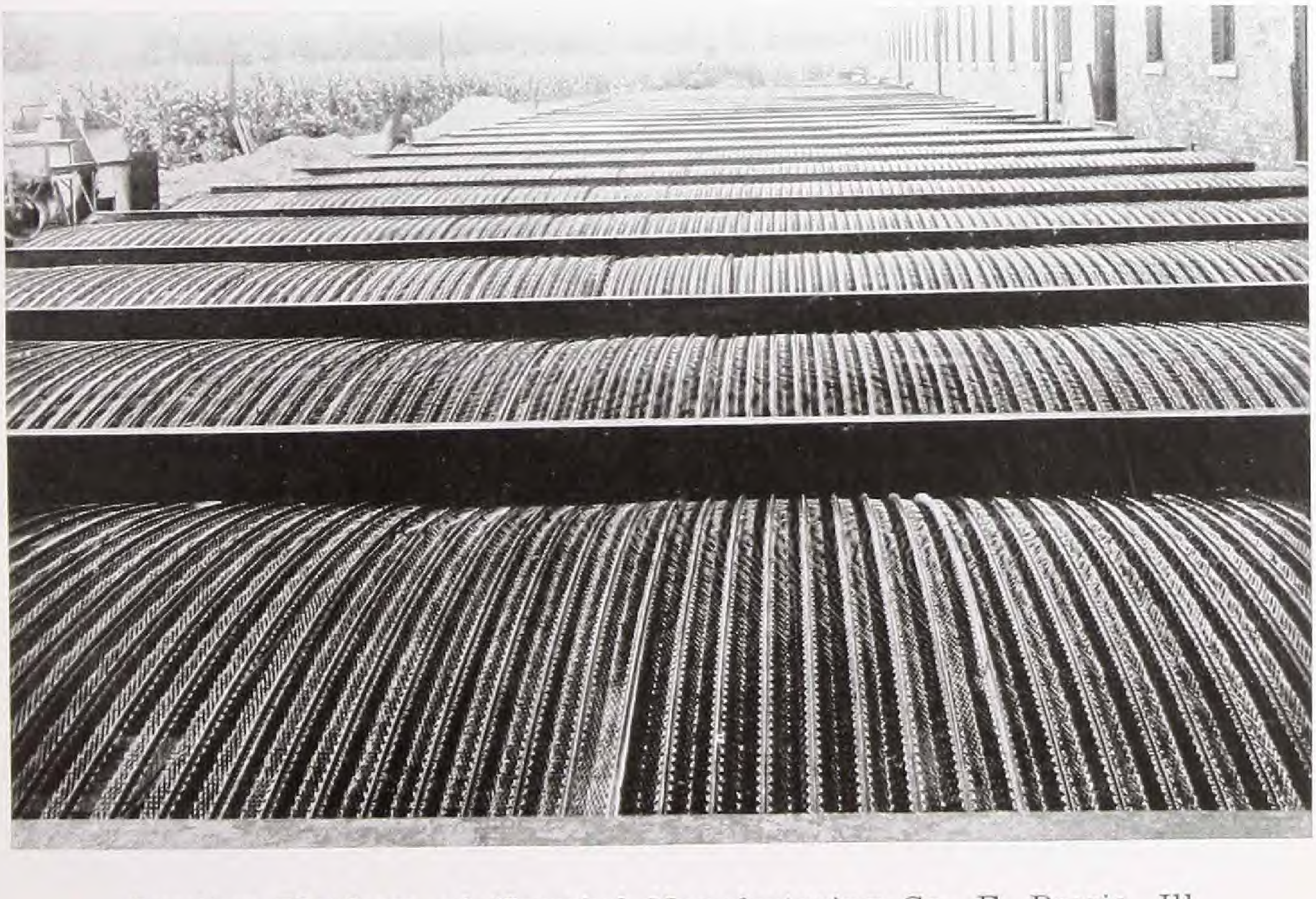


RULE—Divide rise by chord; find in the column of heights the number equal to this quotient. Multiply corresponding number in column of lengths by chord. Product equals length of sheet in inches. All quantities to be reduced to inches before commencing operation.

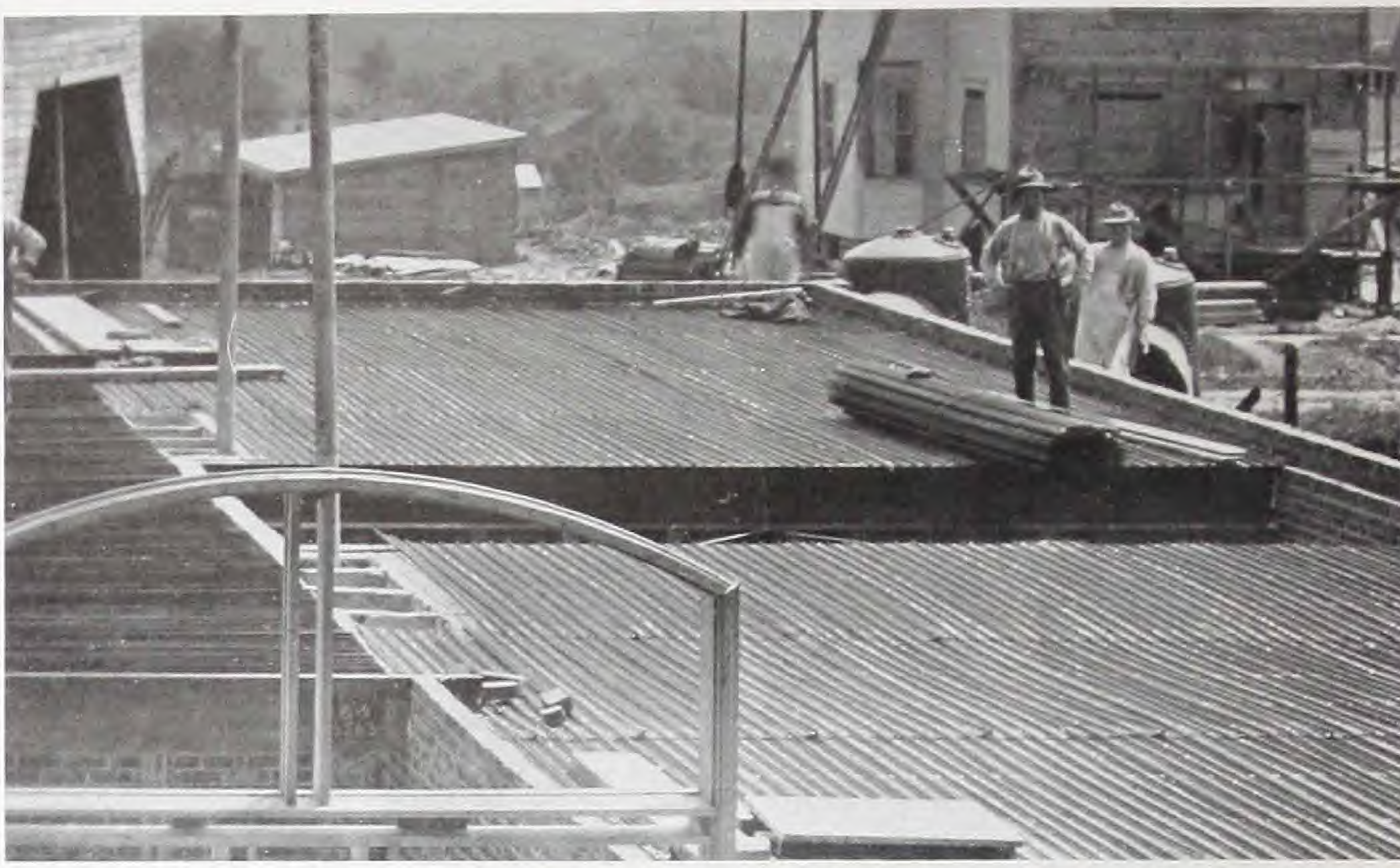
EXAMPLE—Find length of sheet, chord being 8′–4″, rise being 2′–1″, span being 8′–5″. 2′–1″ equals 25″; 8′–4″ equals 100″; 25–100 equals .25 and from table below in columns of lengths .25 equals 1.15912. 1.15912 x 100″ equals 115.912″ equals 9′–7.91″equals 9′–8″ length of sheet required to make arch.

Heights	Lengths	Heights	Lengths	Heights	Lengths	Heights	Lengths
.025	1.00167	.190	1.09365	.295	1.21794	.400	1.38322
.050	1.00665	.195	1.09850	.300	1.22495	.405	1.39196
.075	1.01493	.200	1.10348	.305	1.23205	.410	1.40077
.100	1.02645	.205	1.10855	.310	1.23925	.415	1.40966
.105	1.02914	.210	1.11374	.315	1.24654	.420	1.41861
.110	1.03196	.215	1.11904	.320	1.25391	.425	1.42764
.115	1.03990	.220	1.12445	.325	1.26137	.430	1.43673
.120	1.03797	.225	1.12997	.330	1.26892	.435	1.44589
.125	1.04116	.230	1.13557	.335	1.27656	.440	1.45512
.130	1.04447	.235	1.14136	.340	1.28428	.445	1.46441
.135	1.04792	.240	1.14714	.345	1.29209	.450	1.47377
.140	1.05147	.245	1.15308	.350	1.29997	.455	1.48320
.145	1.05516	.250	1.15912	.355	1.30794	.460	1.49269
.150	1.05896	.255	1.16526	.360	1.31599	.465	1.50224
.155	1.06288	.260	1.17150	.365	1.32413	.470	1.51182
.160	1.06693	.265	1.17784	.370	1.33234	.475	1.52152
.165	1.07109	.270	1.18428	.375	1.34063	.480	1.53126
.170	1.07537	.275	1.19082	.380	1.34899	.485	1.54186
.175	1.07977	.280	1.19743	.385	1.35744	.490	1.55090
.180	1.08428	.285	1.20419	.390	1.36596	.495	1.56083
.185	1.08890	.290	1.21202	.395	1.37455	.500	1.57079

Arched Self-Sentering Floors, Zett Brewery, Syracuse, N. Y.

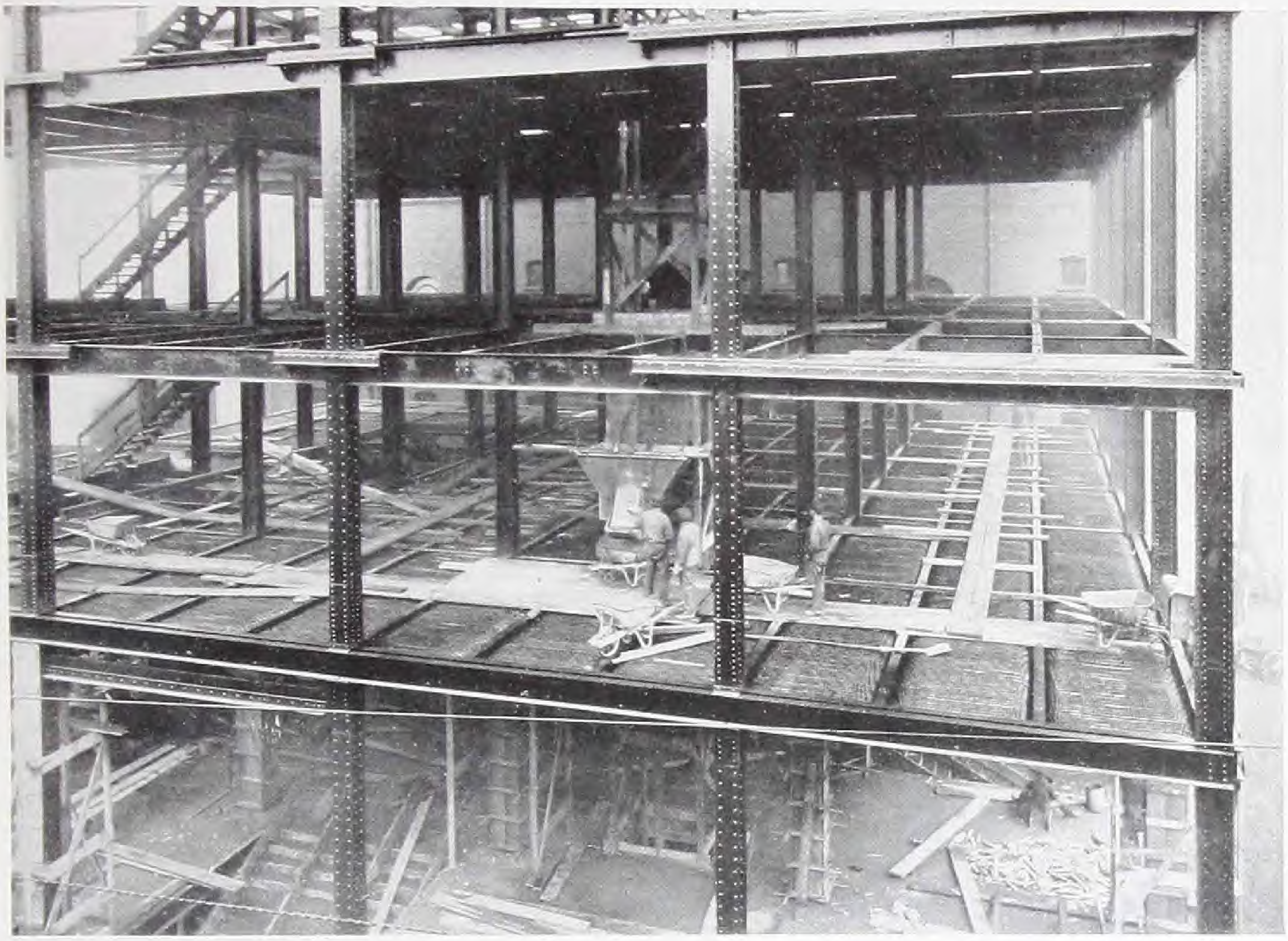


Loading Platform of Herschel Manufacturing Co., E. Peoria, Ill.
Showing Curved Self-Sentering on 12′ spans



Oak Hill High School, Oswego, N. Y.
Sheets attached on the ground and hoisted to the roof in a roll
Architect, L. L. Cope, Oswego

Lighting Plant, Ada, Oklahoma
Self-Sentering used on Concrete Beams. Sides of Beam Boxes are wired together to save bracing



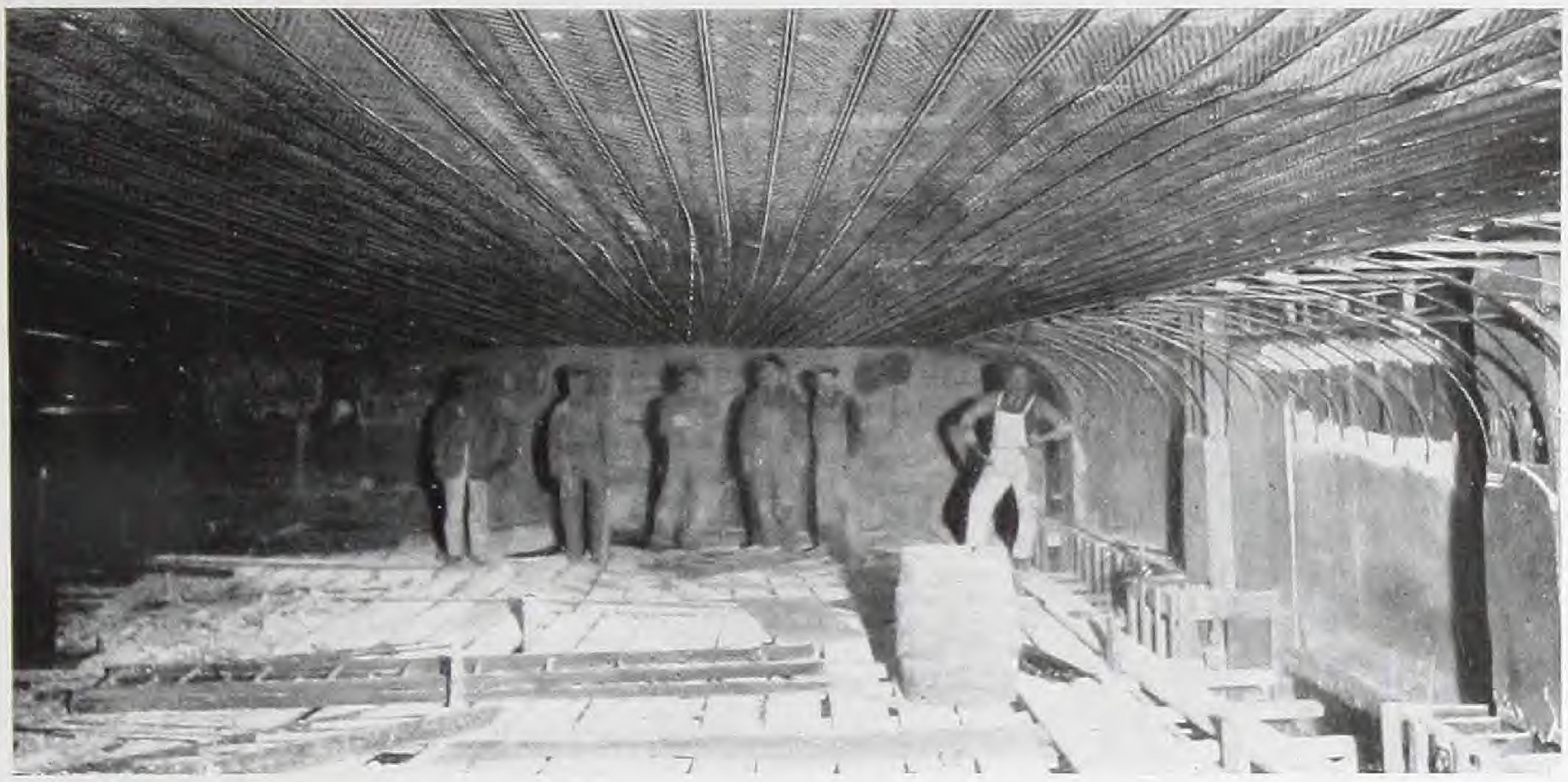
City Hall, Youngstown, Ohio
Curved Self-Sentering used for floors throughout

Another view of City Hall, Youngstown, Ohio
Architect, Chas. F. Owsley, Youngstown, Ohio

Grove City College, Grove City, Pa.
Self-Sentering for floors of Boys' Dormitory
Style "G" Expanded Metal gives added reinforcement over corridors

Pabst Brewery Building, Milwaukee, Wis.
Showing underside of curved Self-Sentering Floors

Self-Sentering Ceilings



Self-Sentering Ceiling—East High School, Minneapolis
Wm. M. Kenyon, Architect

For fireproof ceiling work wherever suspended ceilings are required, or where beams or other supports are too far apart to permit the use of metal lath without cross furring, Self-Sentering offers an economical type of construction. In this capacity, it acts as both lath and furring, the heavy ribs taking the place of small channels or angles necessary with metal lath and the diamond mesh connecting fabric forming a perfect plastering surface. The Self-Sentering is merely secured by clips or wiring to all beams or hangers at each heavy rib, these supports being spaced from 3 to 5 feet on centers, depending on the gauge of Self-Sentering used. Due to the close spacing ($3\frac{5}{8}$ inches center to center) of the Self-Sentering ribs an unusually firm surface is afforded for the plaster and necessary strength is developed to support the ceiling load.

In addition to the added strength given to such a ceiling by reason of the closely spaced ribs, the saving in both time and material effected by the elimination of all furring and the labor entailed in its application is a very material consideration. The large sheets of Self-Sentering permit very rapid erection of such a ceiling, reducing the number of laps and cutting labor costs. Under circumstances as outlined above, this is the simplest and most economical form of fireproof ceiling.

Ceiling Specifications

For all suspended ceilings, Self-Sentering shall be attached with lath surface down to lines of support at every rib, either by wiring with No. 14 gauge wire, or by special clips. Supports may be varied as to spacing from 3 to 5 feet, using

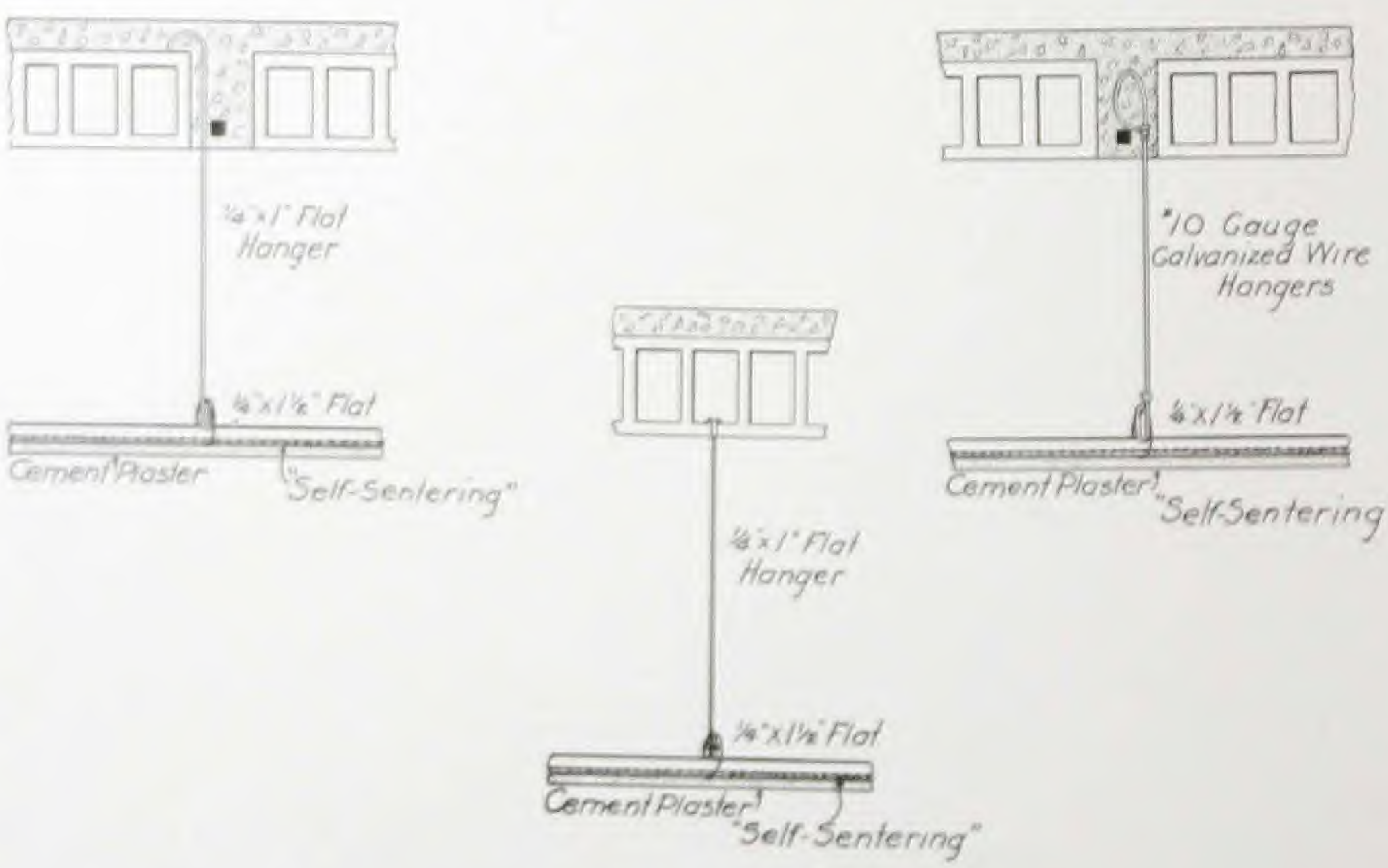
28 gauge Self-Sentering for spans up to 4 feet.
26 gauge Self-Sentering for spans up to 5 feet.
24 gauge Self-Sentering for longer spans.

Supports to be hung from roof or floor slabs by $\frac{1}{4}$ x 1-inch flats or by $\frac{3}{8}$-inch rounds. Supports (excepting regular floor beams), should be $1\frac{1}{4}$-inch channels or $\frac{1}{4}$ x $1\frac{1}{2}$-inch flats.

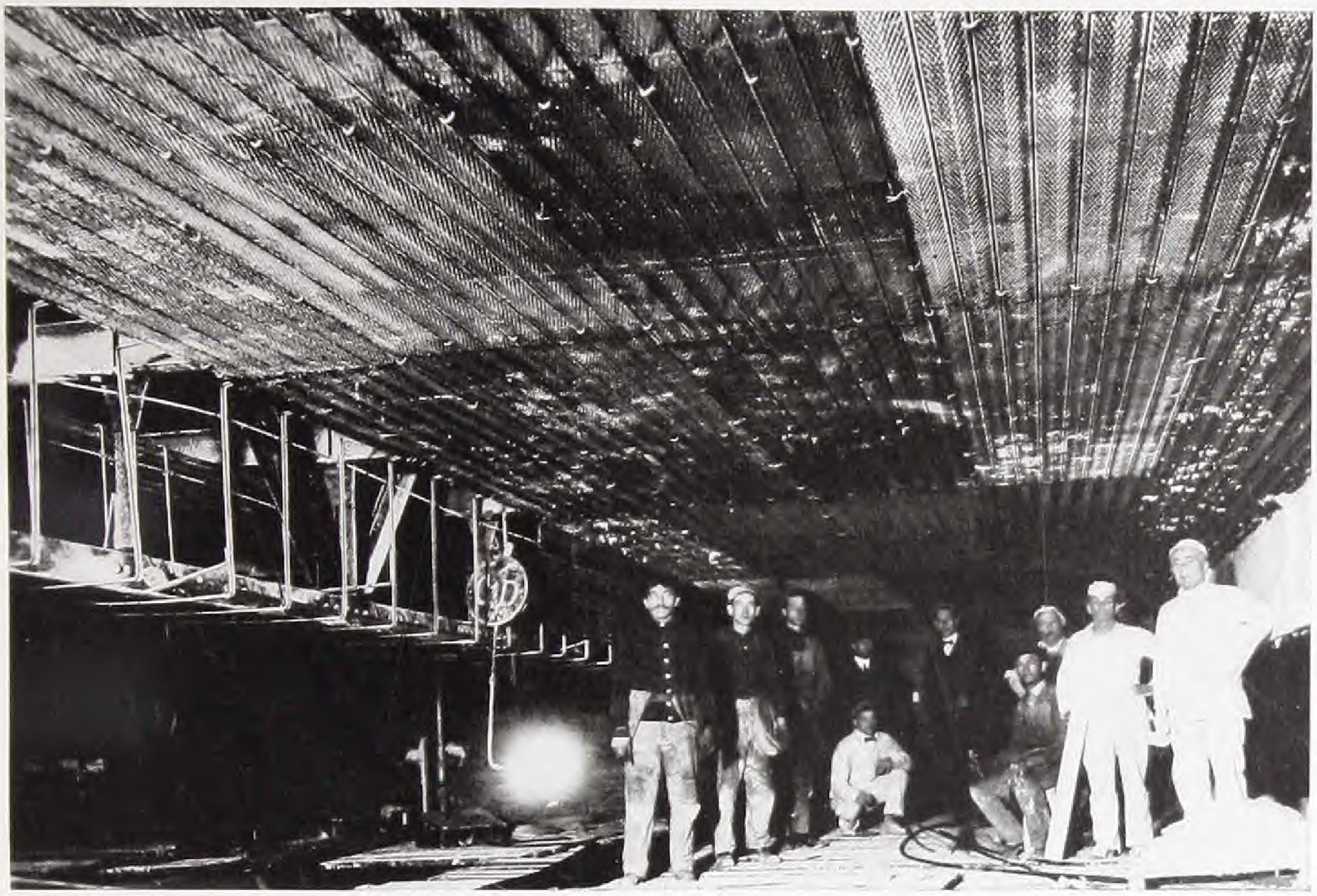
Sides and ends of adjoining sheets shall be securely interlocked and fastened every two feet along the sides and at every rib on the ends by wiring. Joints over supports to be 2 inches and between supports 8 inches, the latter to be properly staggered.

As in metal lath ceilings any type of plaster may be used, but it should contain double the amount of hair or fiber required for wood lath work.

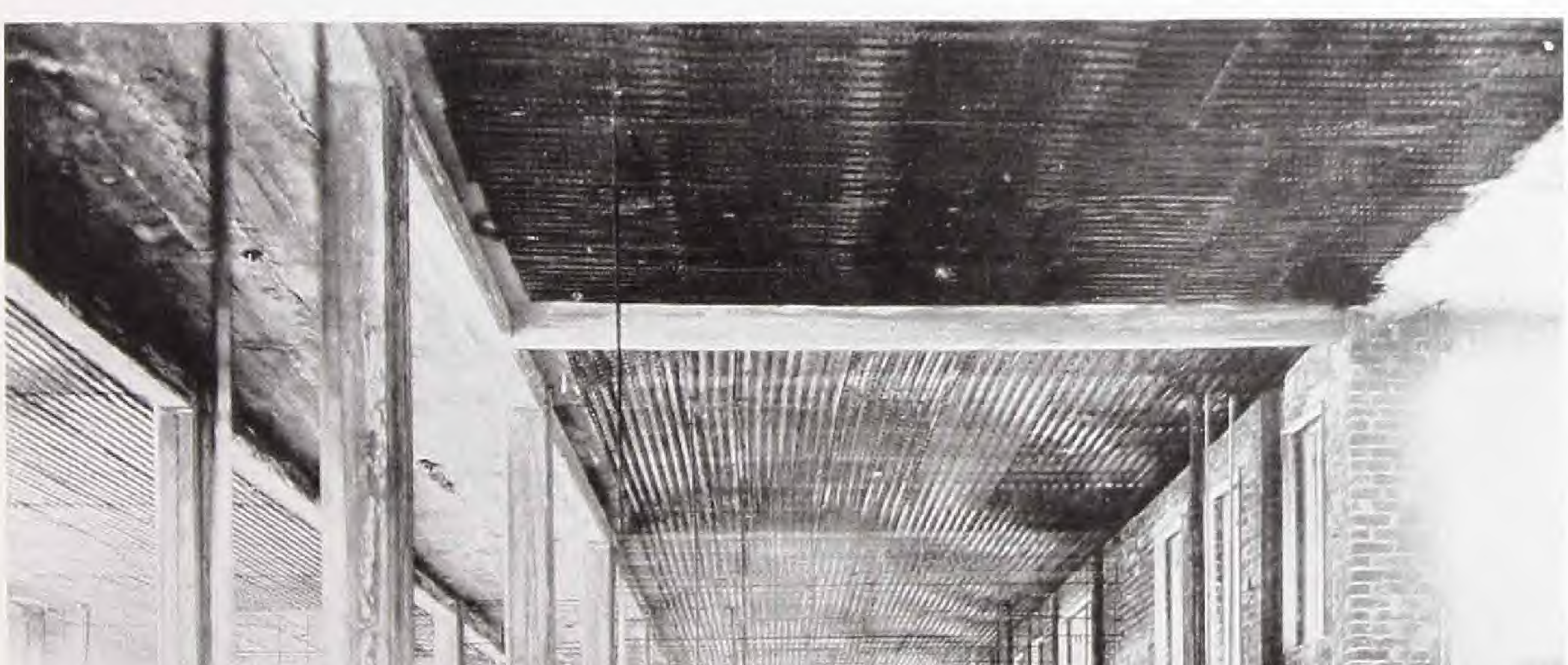
Greenwood Hall, Cincinnati
Self-Sentering Ceiling applied over Asbestos Board, protecting Wood Joists
This construction required by Ohio State Building Code
for this Type of Building



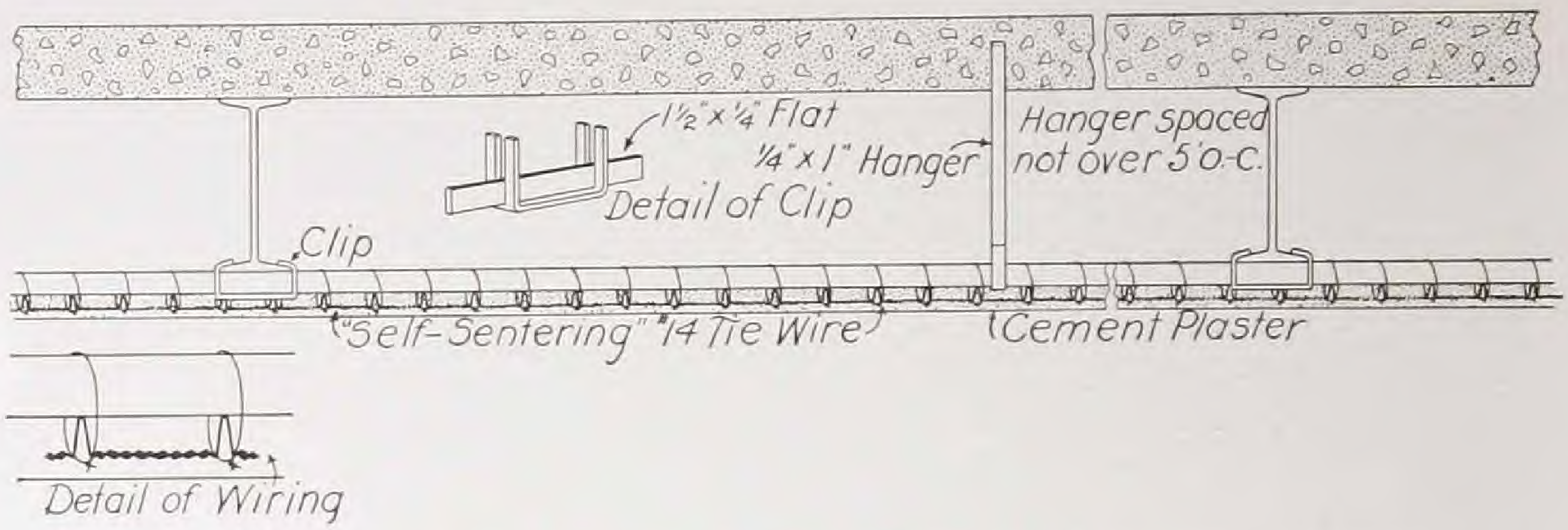
Methods of Hanging Self-Sentering Suspended Ceilings from Tile and Concrete Slabs



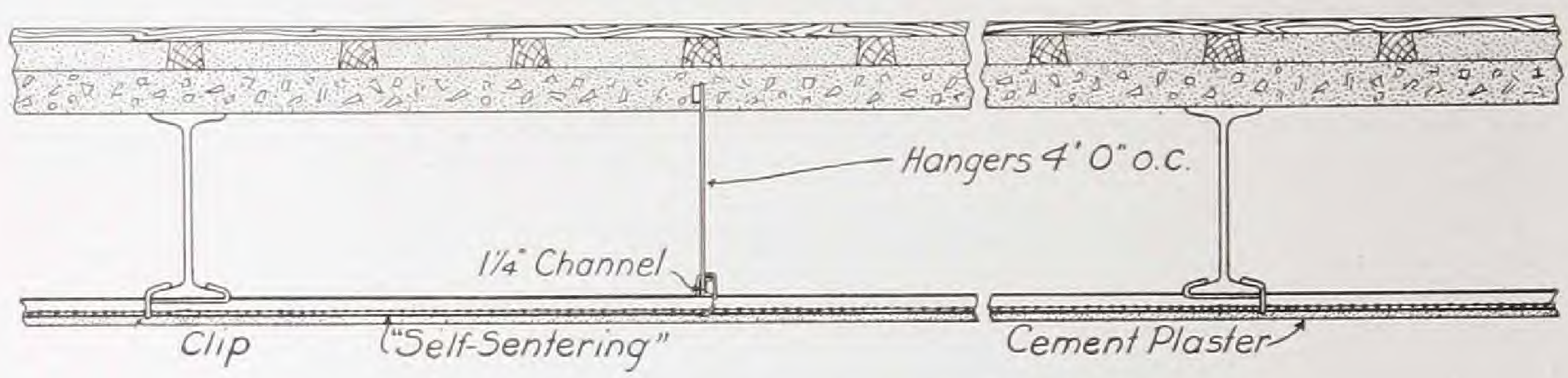
Self-Sentering Suspended Ceiling, Dome Theatre, Youngstown, O.
Architects, Louis Boucherle & Sons



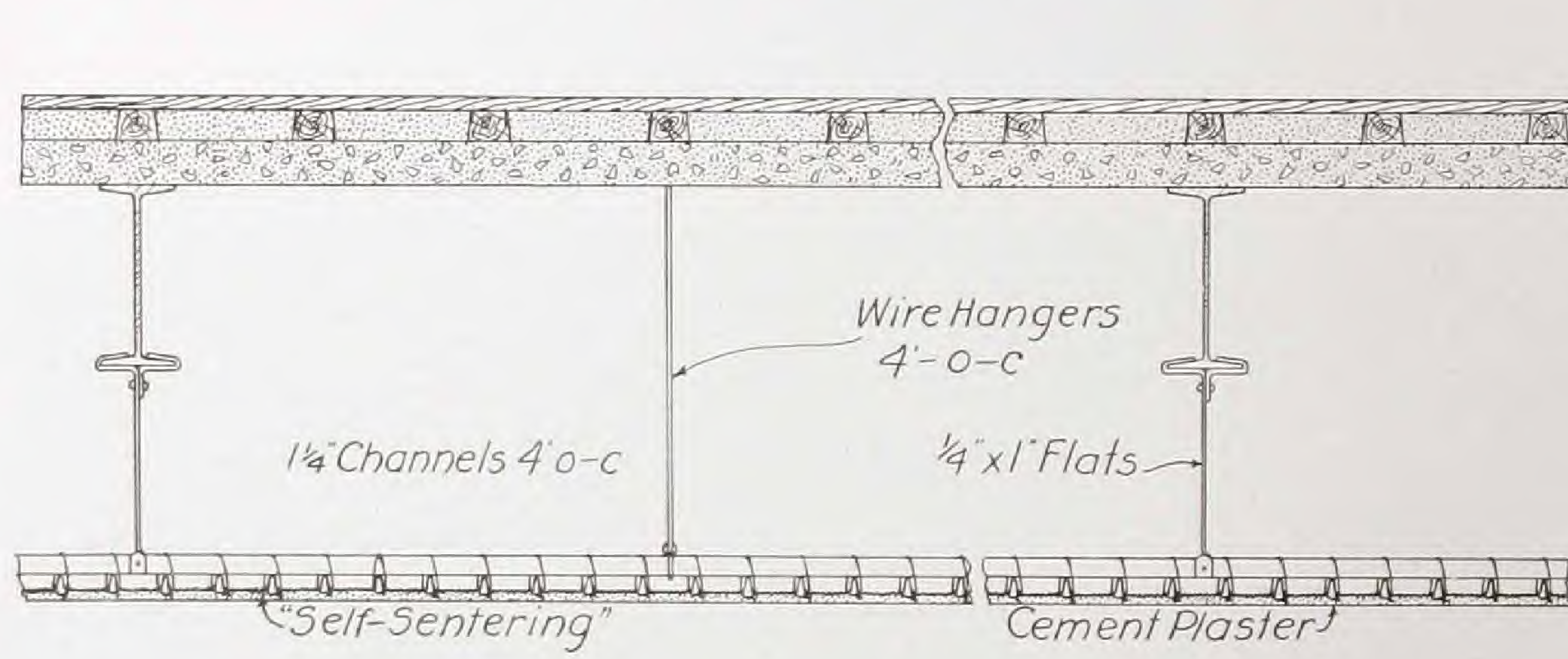
Self-Sentering Ceilings, Carlisle Apartment House, Washington, D. C.



Self-Sentering Ceiling on Steel Beams Fireproofed with Concrete



Self-Sentering Ceiling on Plain Steel Beams



Self-Sentering Ceiling Suspended from Steel Beams and Concrete Slab

Self-Sentering Ceiling Suspended from Fireproofed Steel Beams

Detail of Clip for Attaching Self-Sentering Direct to Steel Beams for Ceiling Work

Canadian Pacific Railway Building, Toronto, Ont. Self-Sentering used for all Suspended Ceilings

Showing Underside of Self-Sentering Roof and Self-Sentering Ceiling on Laundry Building for State Hospital for Insane, Mendota, Wis.

Self-Sentering Solid Partitions

SELF-SENTERING is the basis of a solid partition erected without the use of studs. These partitions show maximum strength and rigidity with minimum weight, embody simplicity of construction by eliminating permanent studding, and have a wide range of adaptability for all classes of buildings.

Self-Sentering is especially suitable for solid partitions in storerooms, office buildings, warehouses, factories, machine shops and general mercantile buildings, also extensively used for elevator and air shafts.

The use of Self-Sentering in solid partition construction gives a wall 1⅞ inches thick, or as much thicker as desired, constructed without permanent studding of any character, yet making an absolutely fireproof plastered partition. Statistics from recent large conflagrations show that solid partitions are of the most durable type, even when subjected to intense heat.

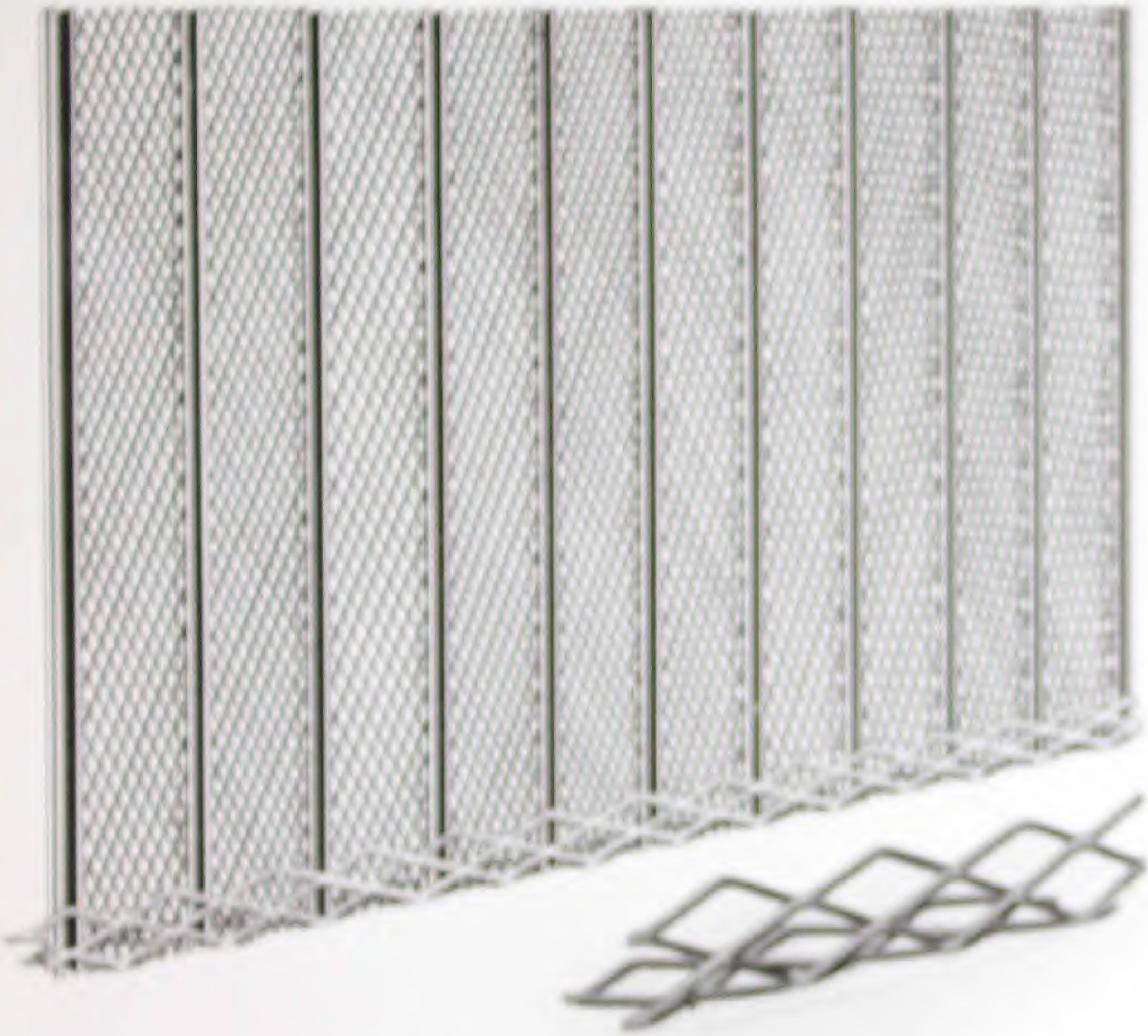
The space-saving features of such a partition are very important. When compared with the ordinary 6-inch partition, a Self-Sentering partition means a saving of one square foot of floor space to every three lineal feet of partition. In office buildings where floor space is worth from $1.50 to $3.50 per square foot, this means a sufficiently increased income to pay for the partition outright in a short time, and, what is more, this increased income comes in, not only the first year, but every year thereafter.

When compared with tile or other block partitions, the saving in dead load is also a considerable item. The Self-Sentering partition weighing but 18 pounds per square foot is much lighter than the block partitions, and in a building of any size will reduce the dead load many tons.

Self-Sentering partitions are economical partitions. The temporary studding required in their erection can be placed very much more rapidly than permanent studding, while the cost is merely nominal, as it is possible to use it over and over again. There is absolutely no waste of plaster, as the first coat applied forms the foundation for the second coat, to be applied on the reverse side. The economy of the construction has made it a great favorite with the building trades throughout the country.

Methods of erection of Self-Sentering partitions under varying conditions are described in detail on the following pages.

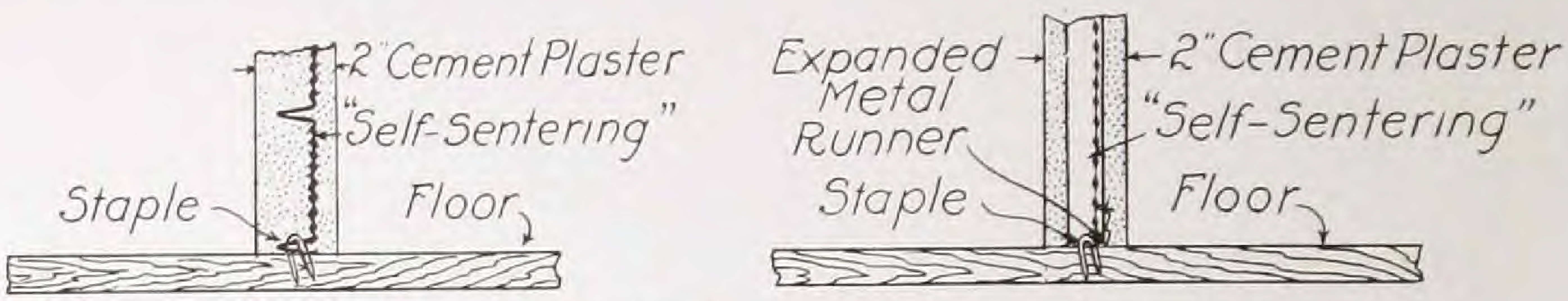
Attaching Self-Sentering to Floor or Ceiling by Expanded Metal Angle



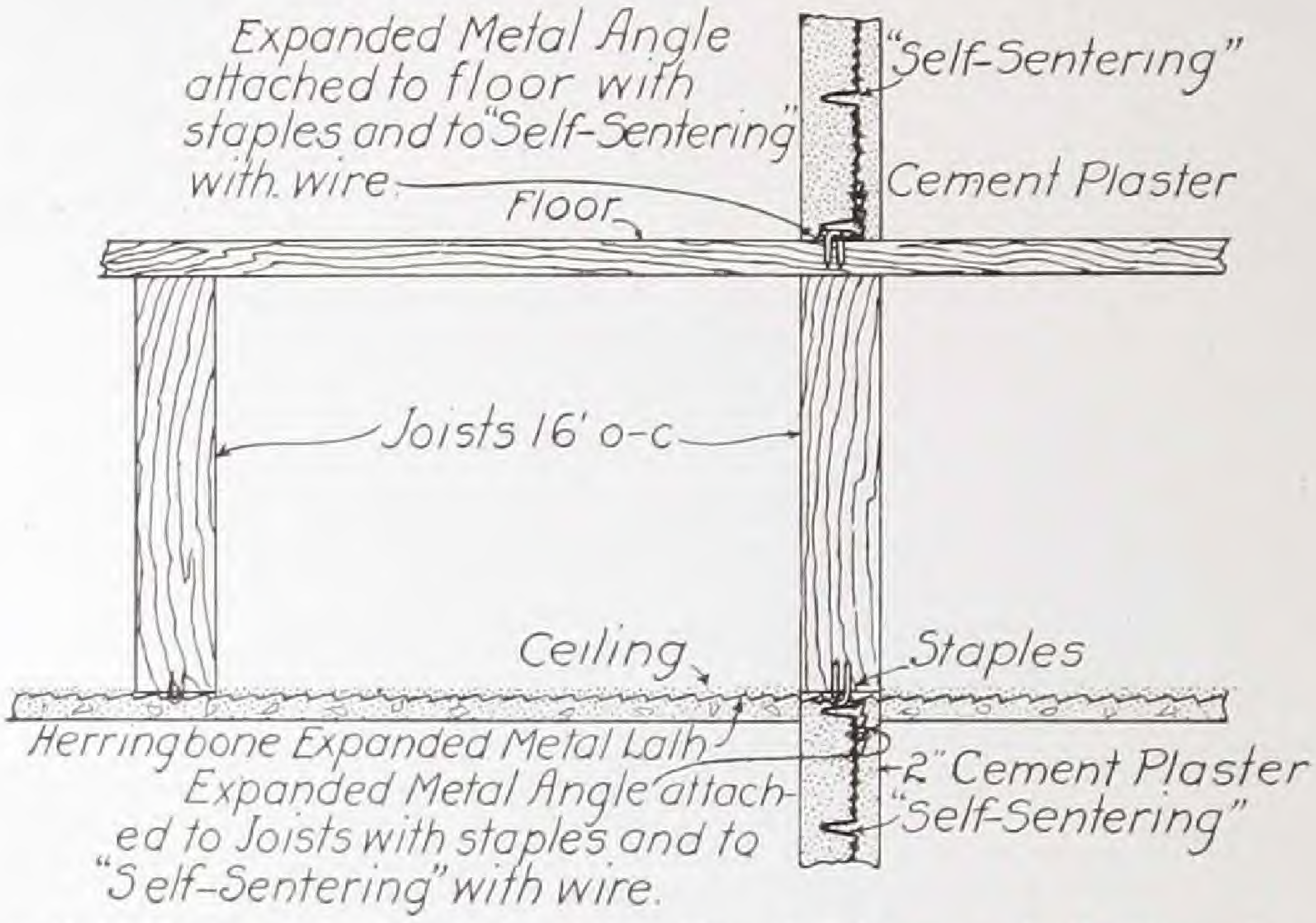
This offers the simplest and most efficient method of attaching Self-Sentering to floor and ceiling. The expanded metal angle is made from No. 13 gauge steel and furnished in lengths up to 8 feet. The meshes are $\frac{3}{4}$ inch wide by $2\frac{1}{2}$ inches long. The angle is merely laid along the line of the proposed partition, stapled to the floor every three feet and the Self-Sentering wired securely to the other leg of the angle. This angle offers no obstruction to the plaster; it is merely imbedded in it and becomes an integral part of the partition, making the fastening absolutely permanent.

There are a number of other methods used for this class of work, however, and the best of these are shown on the following pages.

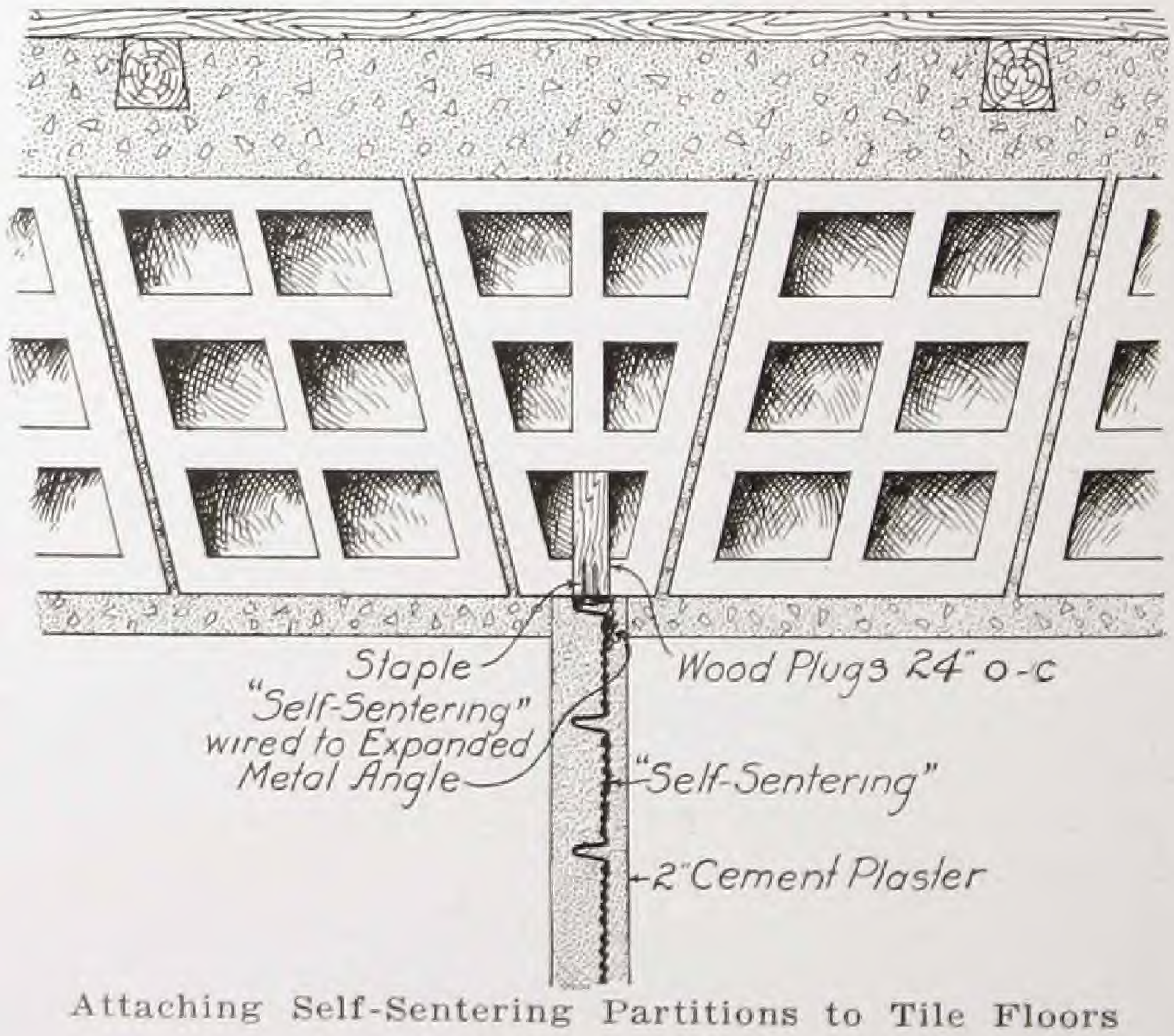
Partition Details



Attaching Self-Sentering Partitions Direct to Wood Floor

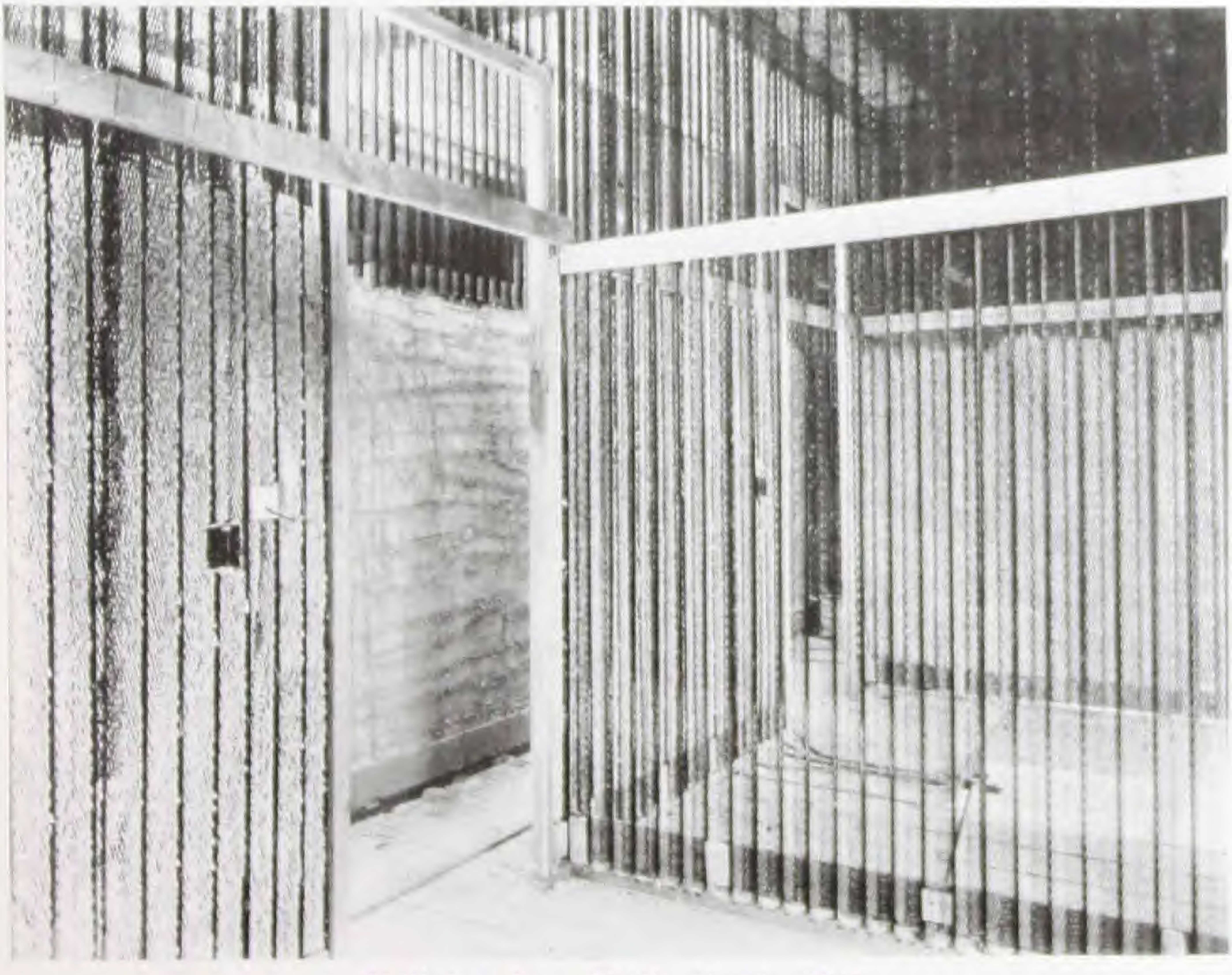


Attaching Self-Sentering Partitions to Wood Floor and Ceiling Joists with Expanded Metal Angle

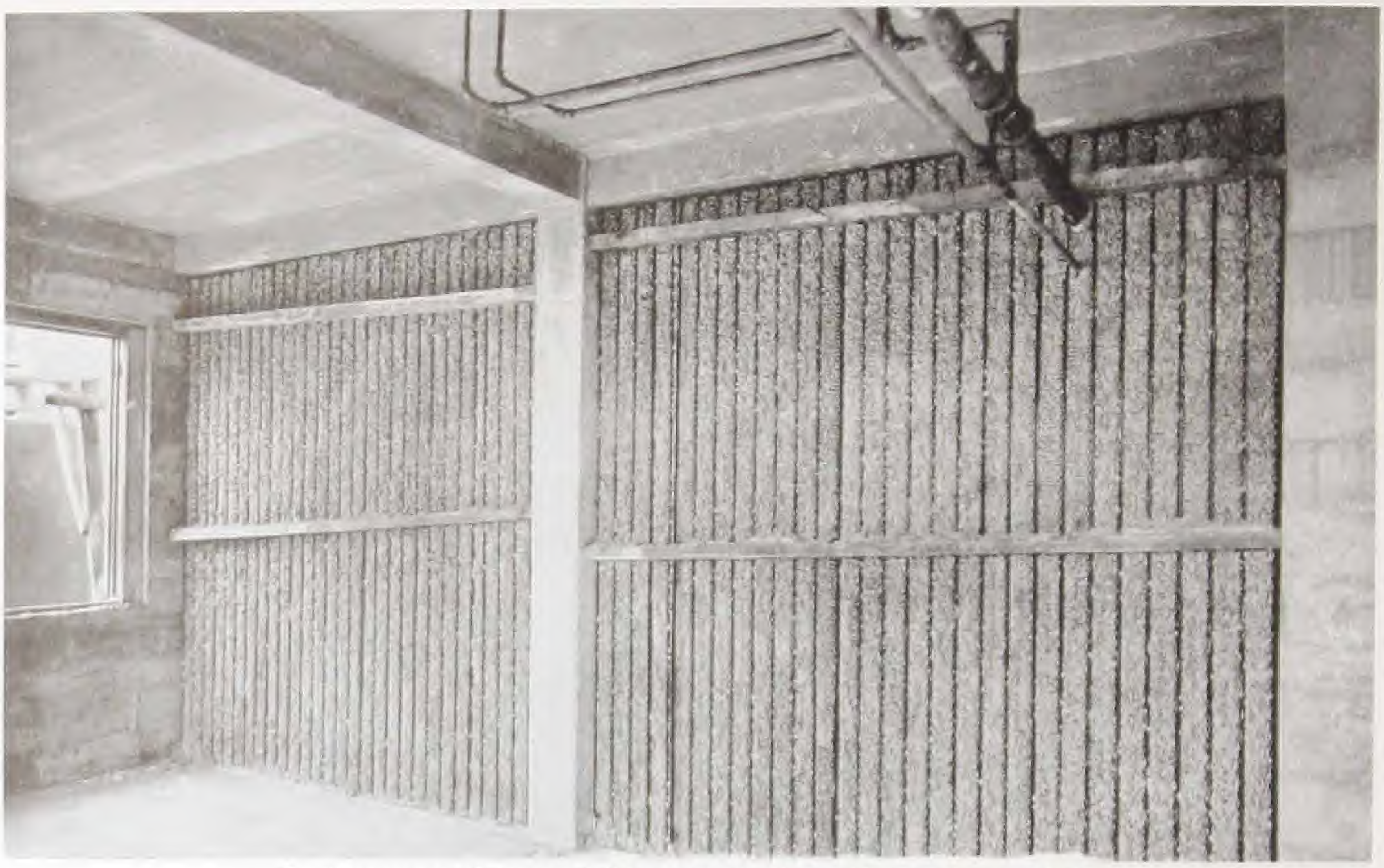


Attaching Self-Sentering Partitions to Tile Floors

Letterman General Hospital, San Francisco, Cal.
Self-Sentering used for 2-inch Solid Partitions

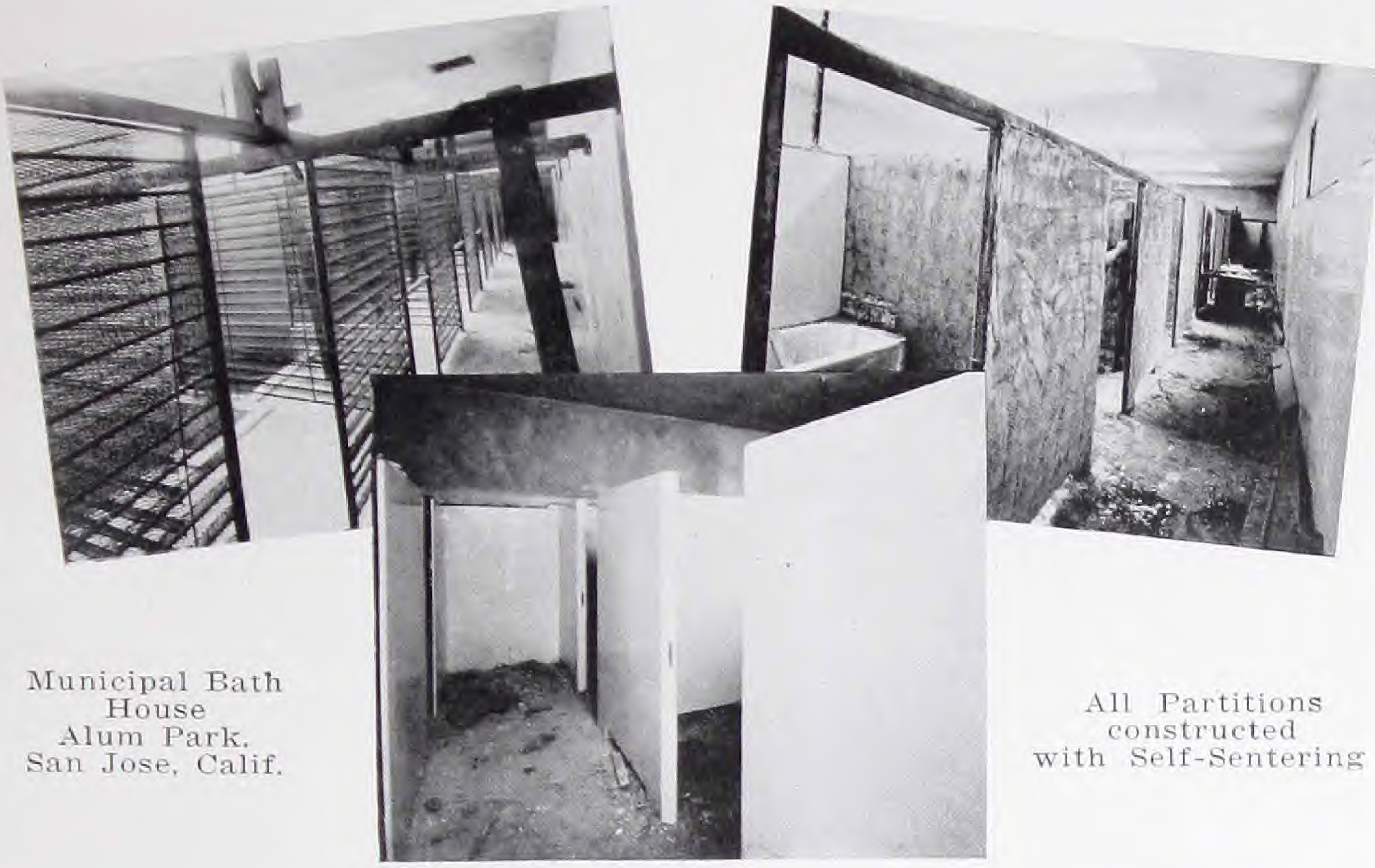


Halliday Inn, Battle Creek, Mich.
Partitions made of Self-Sentering



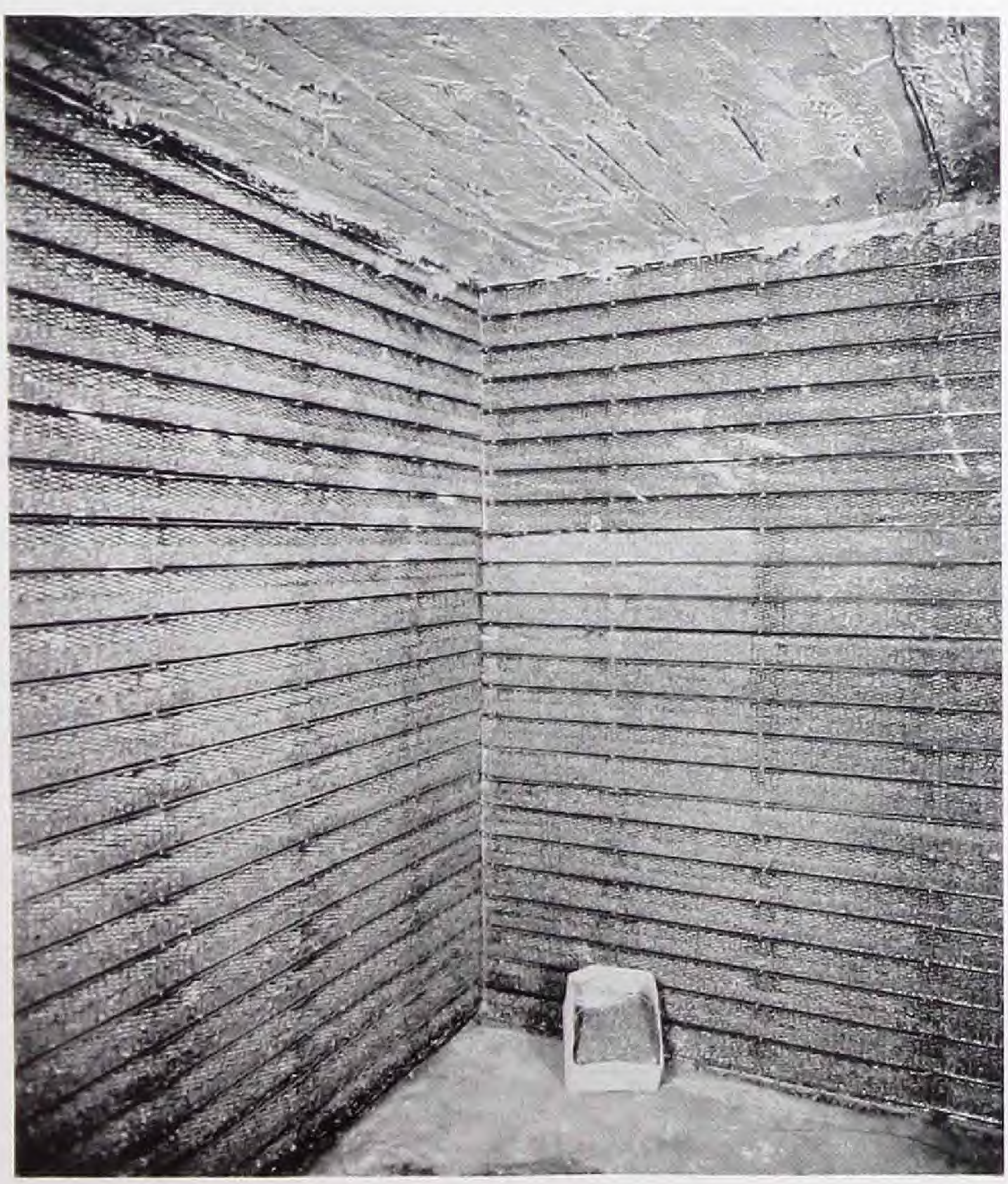
Letterman General Hospital, San Francisco, Cal.
Self-Sentering for partitions—note simple bracing required and NO dropping of mortar

McCabe Hotel, Rock Island, Ill.
Solid partitions of Self-Sentering used throughout



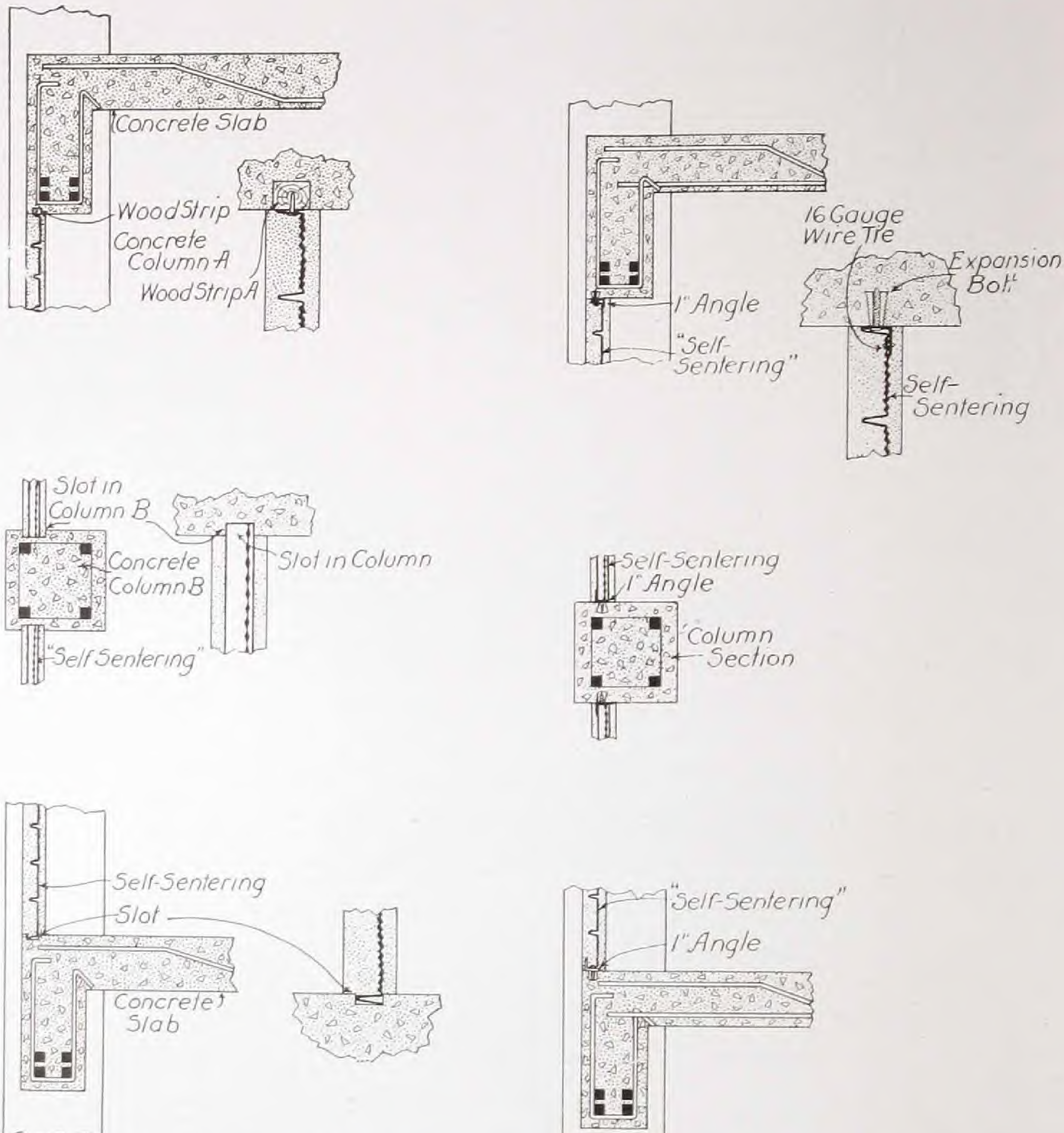
Municipal Bath House Alum Park, San Jose, Calif.

All Partitions constructed with Self-Sentering

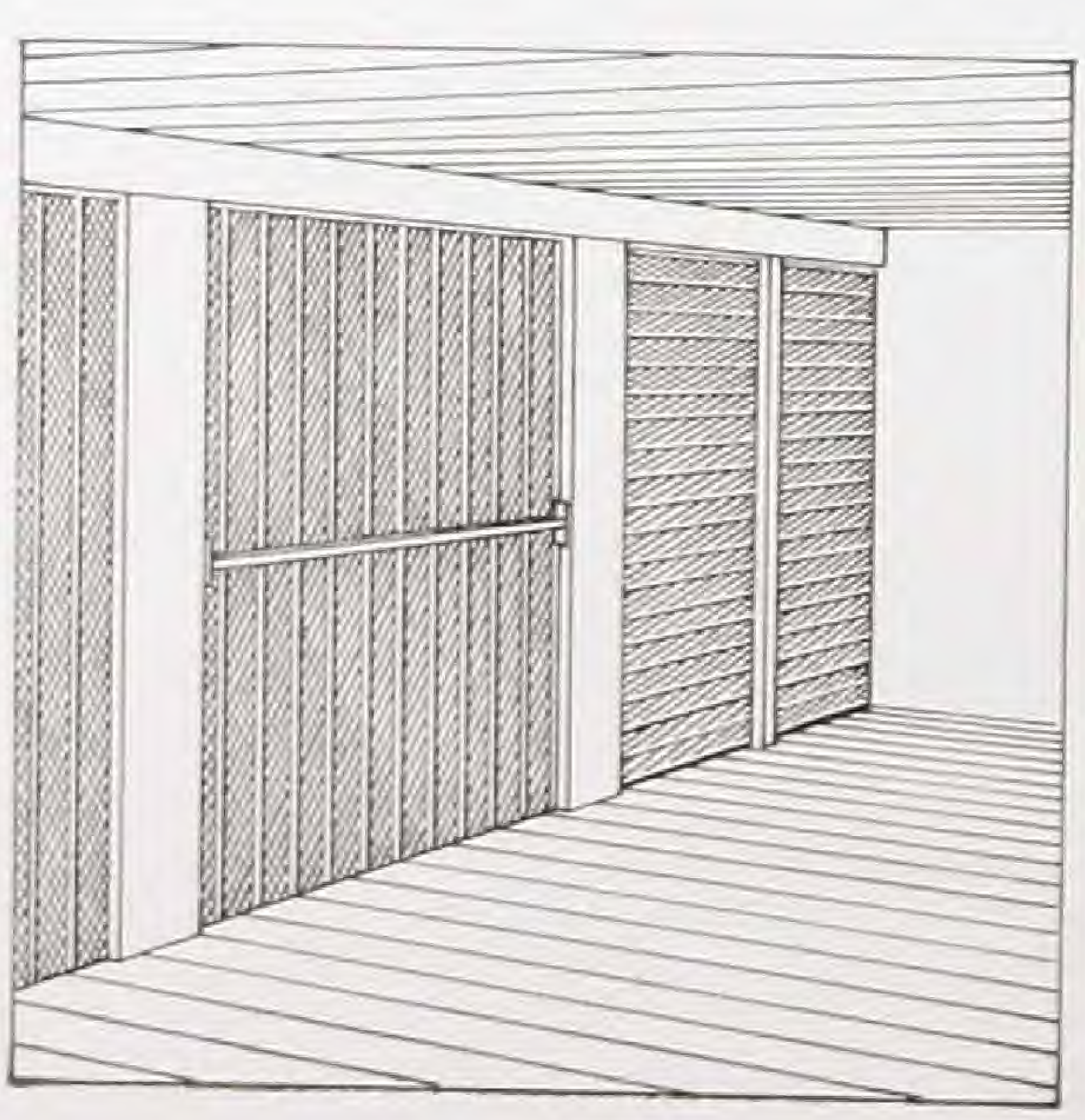


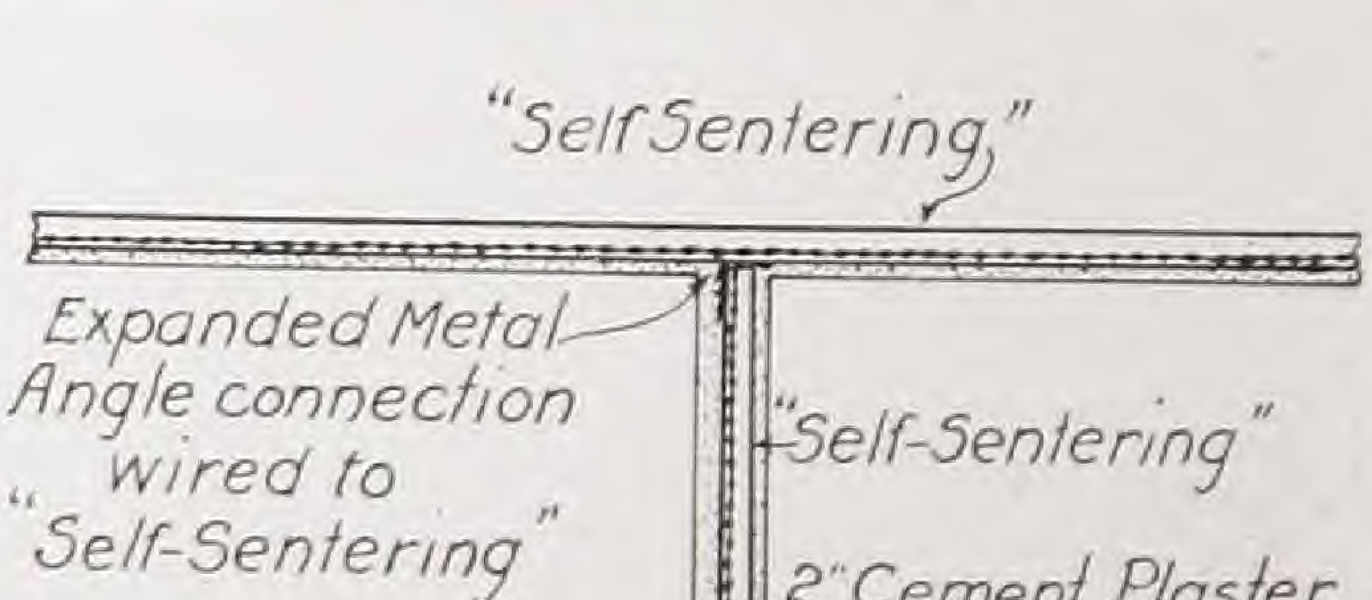
Illustrating the use of Self-Sentering for walls and ceiling of refrigerator room. Self-Sentering was erected on both sides of 2x3 wood studs — 18 inches on centers—with the ribs against the studding. The hollow walls were then filled and the ceiling covered with granulated cork, which furnished the necessary insulation. The walls are then given a finishing coat of plaster.

Lehnhardt's Candy Factory, Oakland, Cal.



Partition Details with Self-Sentering in Reinforced Concrete Buildings

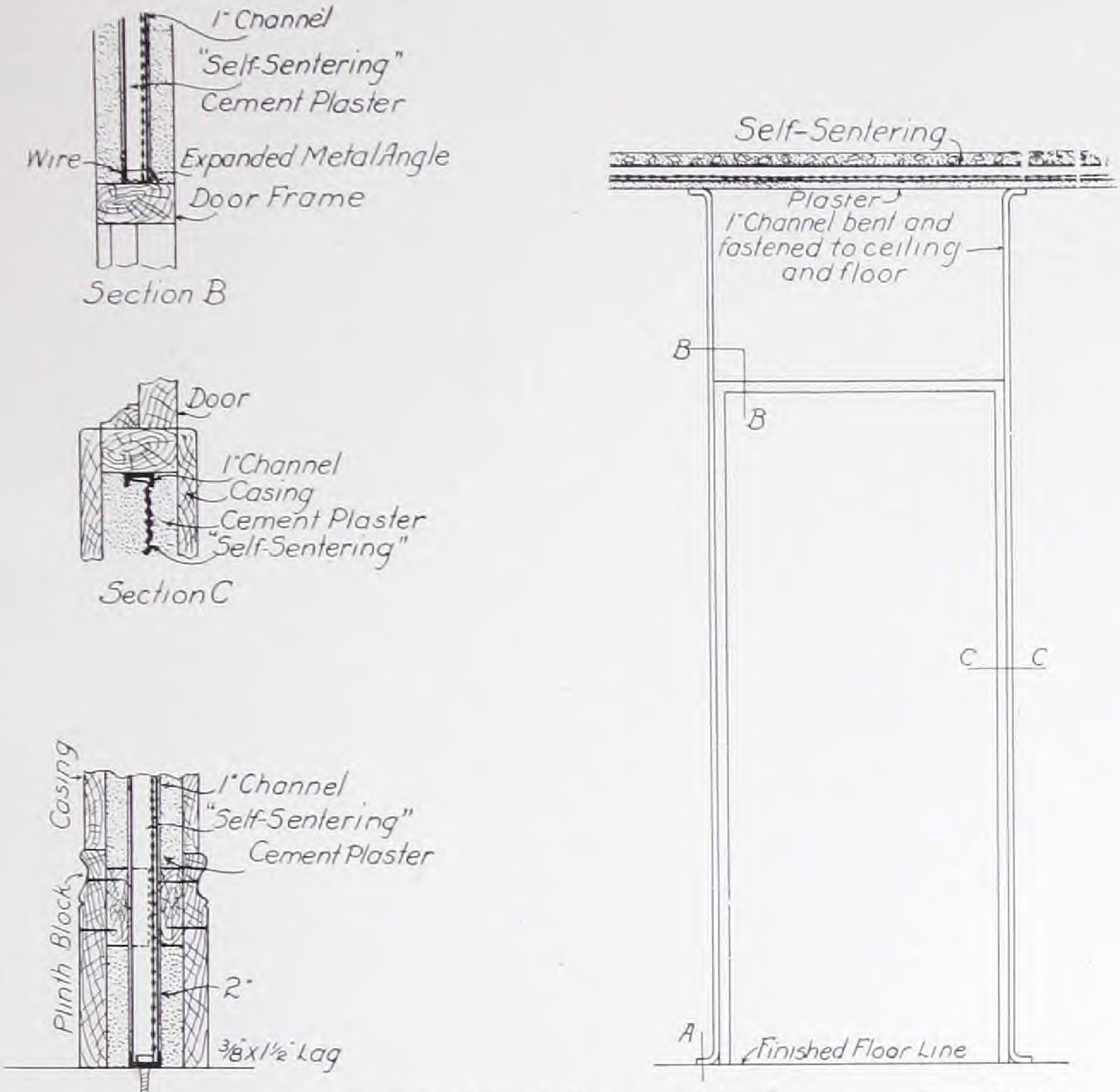




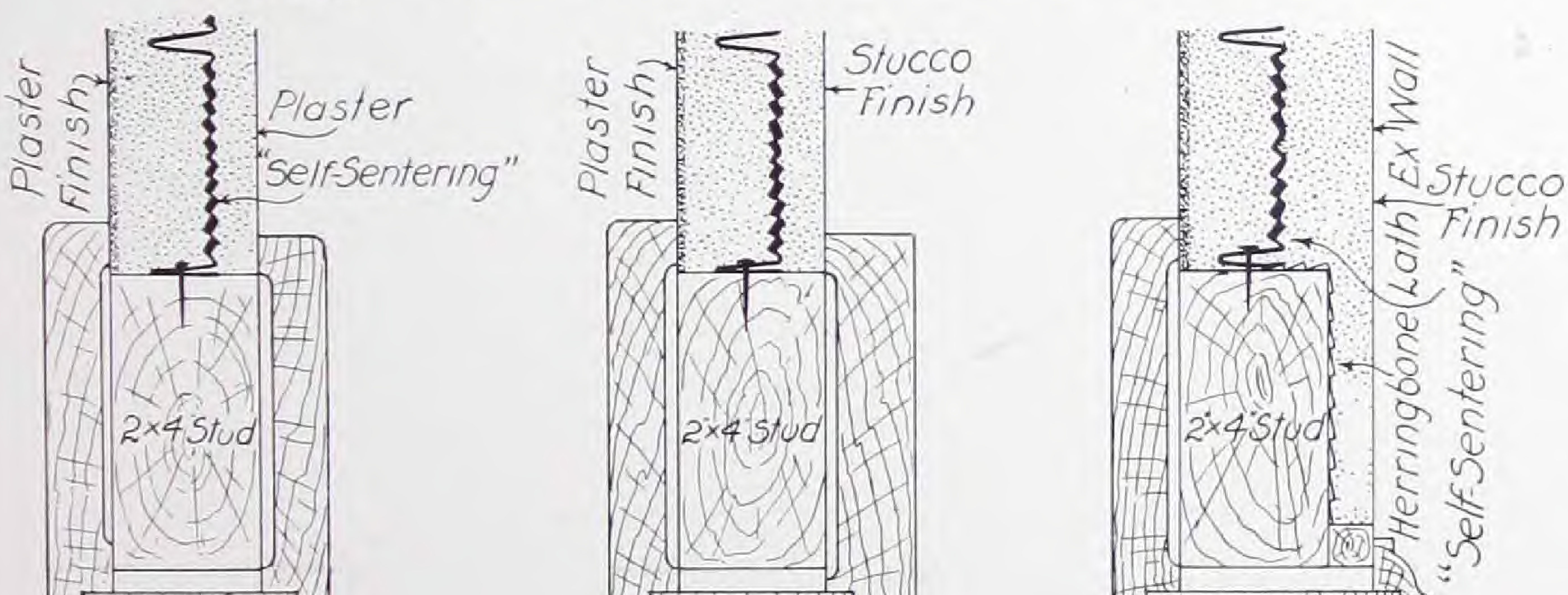
Method of attaching "Self-Sentering" Partition to Suspended Ceiling.

Temporary Bracing of Self-Sentering Partitions

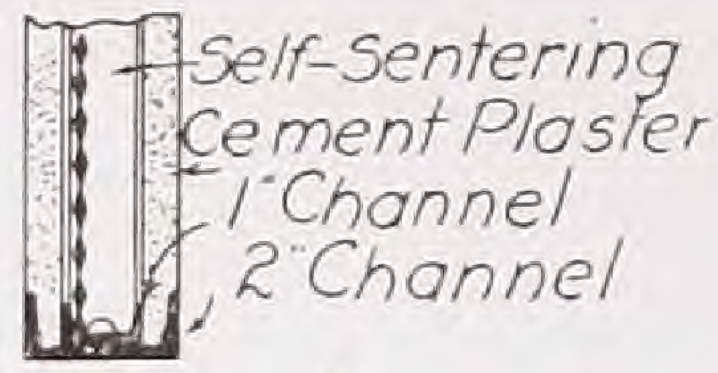
If supports are too far apart to be spanned by one brace, the horizontal braces may be braced from the floor



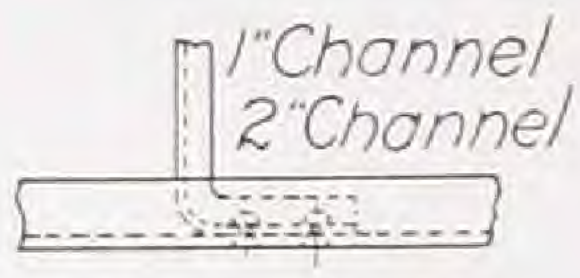
Framing of Wood Doors—Self-Sentering Partitions



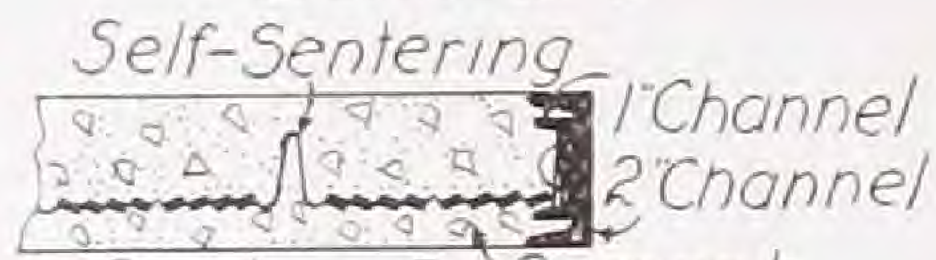
Methods of Framing Wood Doors where Angle Stiffener is Not Used



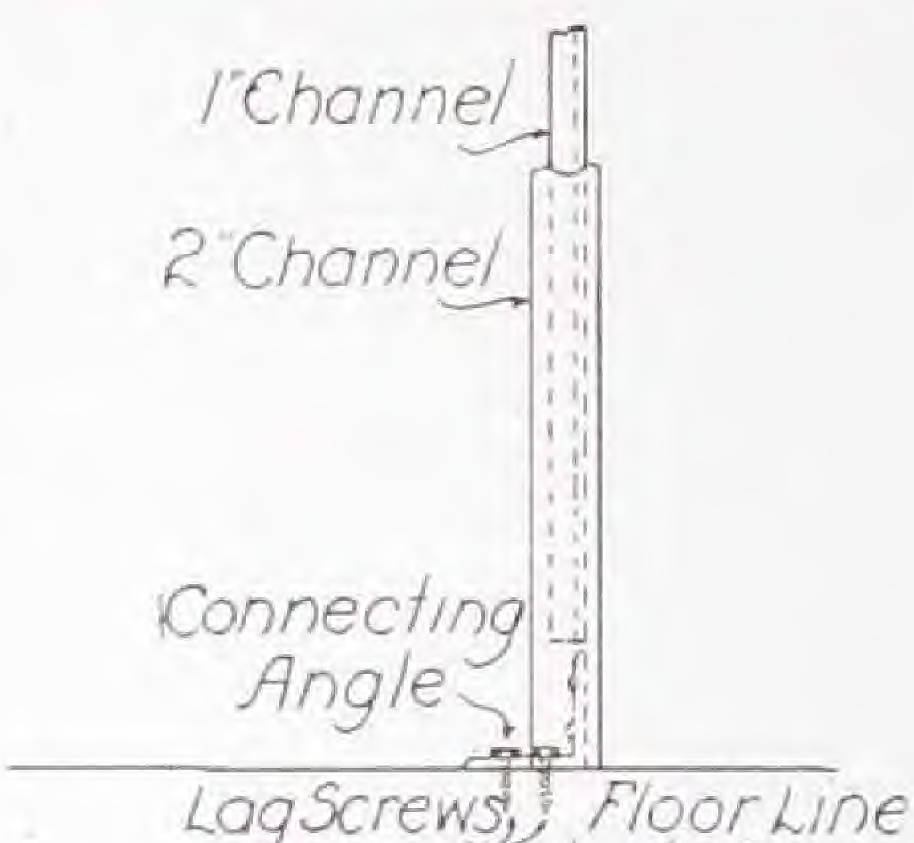
Section D



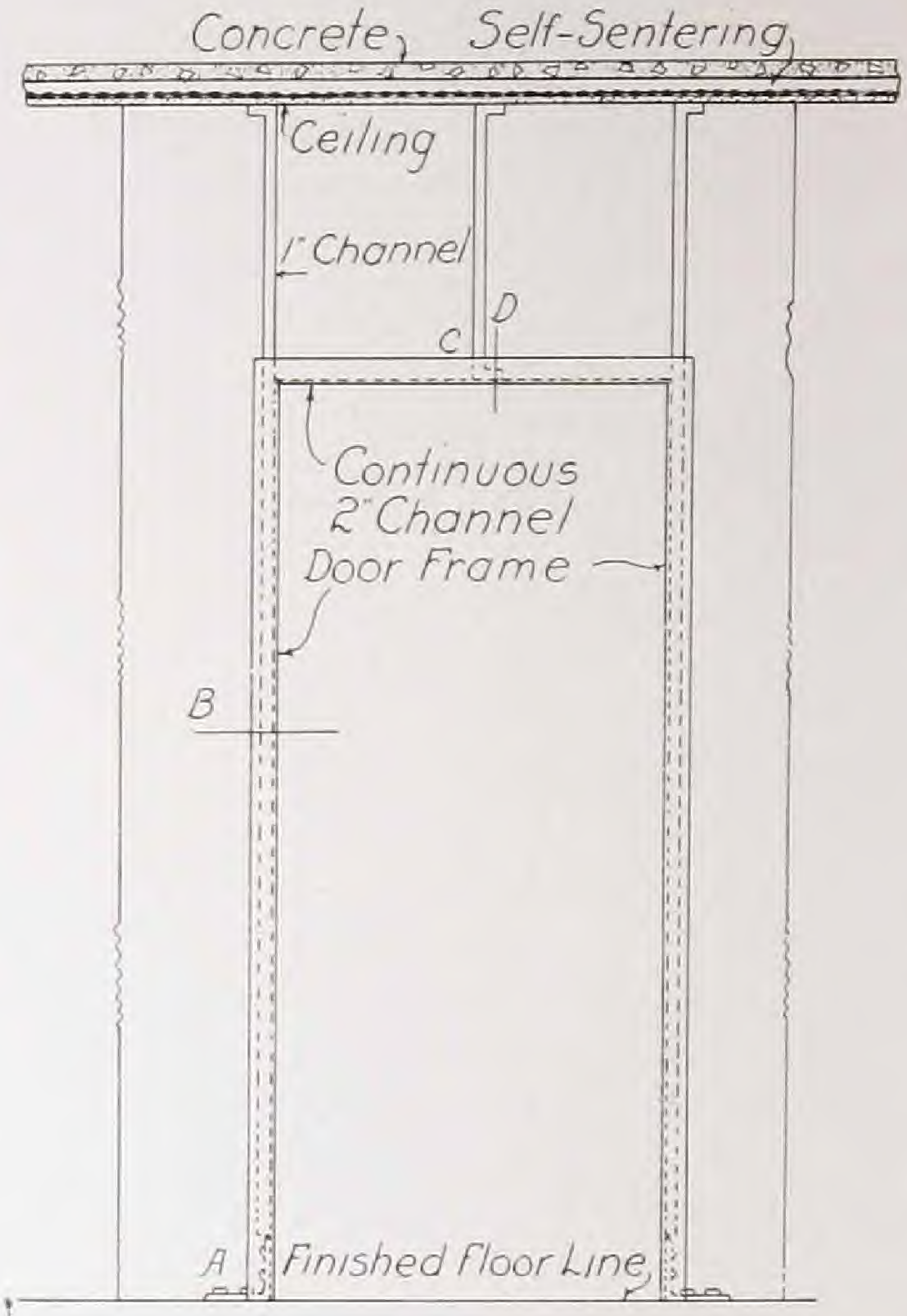
Detail at C



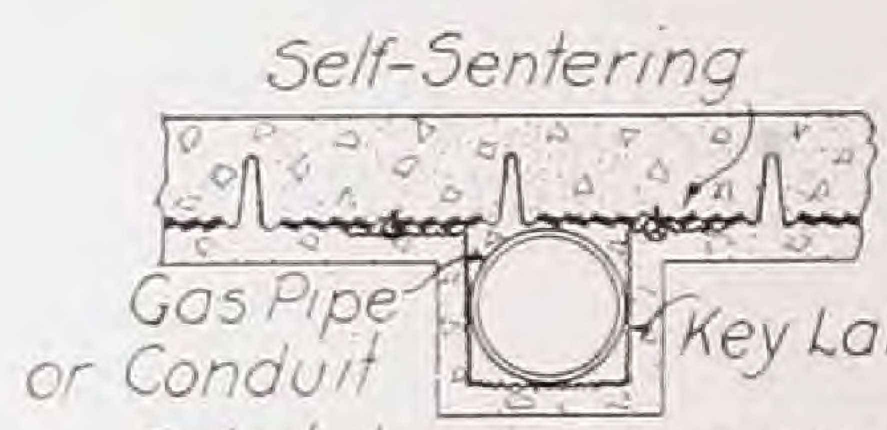
Section B



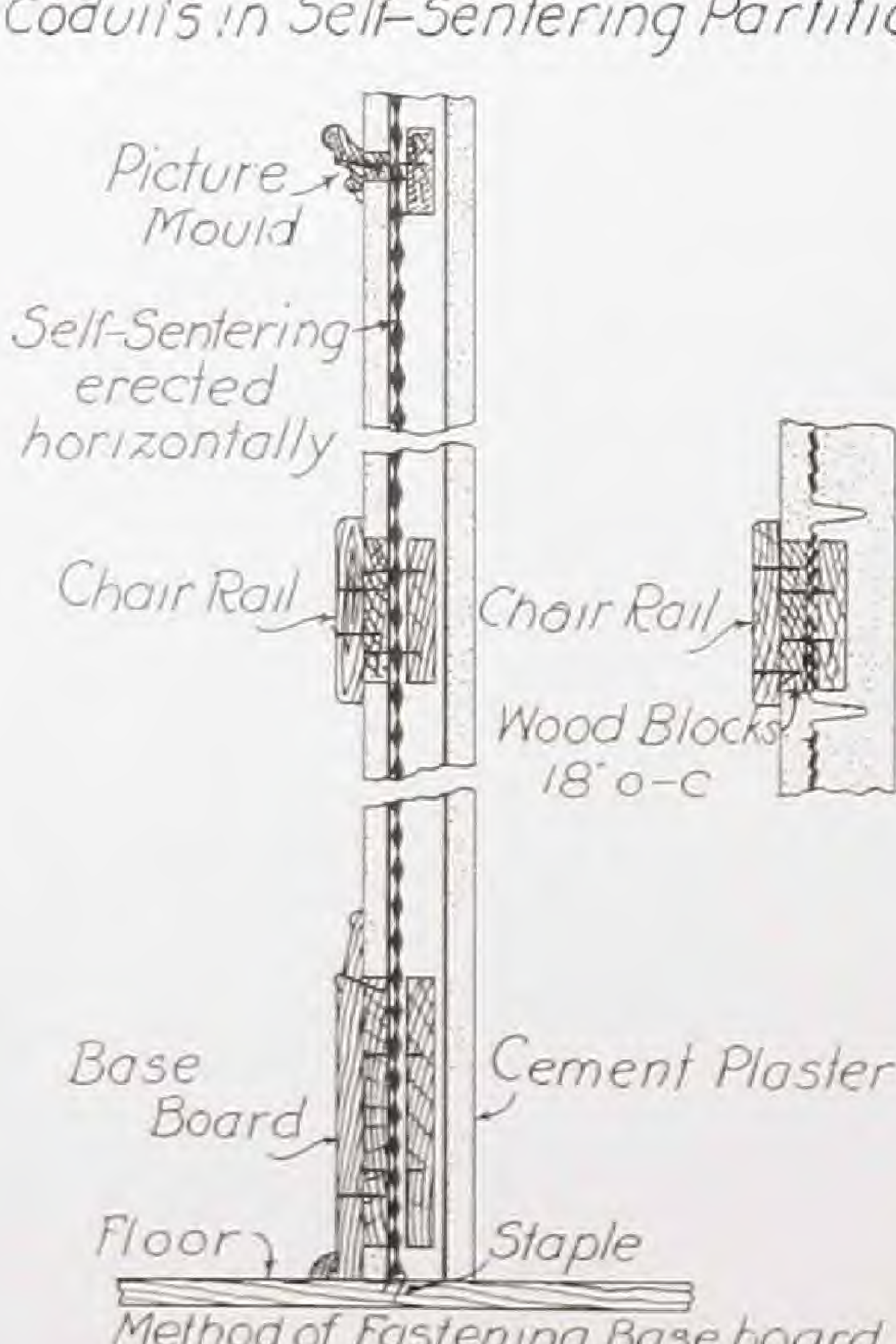
Detail at A



Detail showing placing of pipes or Coduits in Self-Sentering Partitions

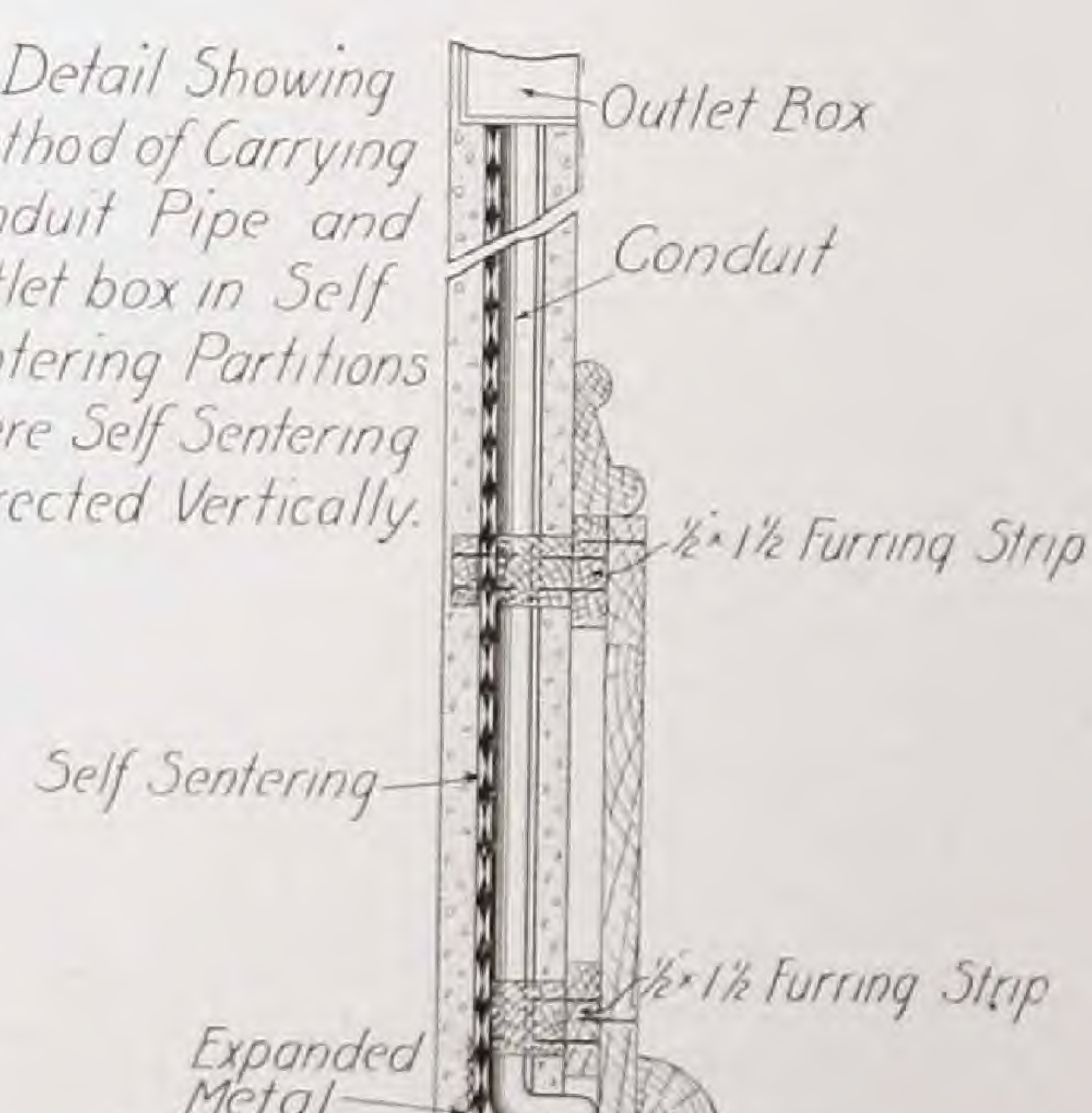


Detail showing arrangement of large pipes in 2" Self-Sentering Partitions



Method of Fastening Base board. Chair rail and Picture mould to Self-Sentering

Detail Showing Method of Carrying Conduit Pipe and Outlet box in Self Sentering Partitions where Self Sentering is erected Vertically.



Solid Partition Specifications

Self-Sentering shall be used for all interior partitions, as indicated on plans.

Height	Self-Sentering
Up to 12 ft.	28 gauge
12 ft. to 17 ft.	26 gauge
Over 17 ft.	24 gauge

Self-Sentering shall be erected on temporary studding with ribs running either horizontally or vertically. This to be controlled by general conditions obtaining, the ribs always running the short way of the span.

Temporary studding shall be wedged or lightly nailed in place, spaced on 5-foot centers, with the ribs of the metal running horizontally. If they run vertically, horizontal cross pieces spaced 5 feet on centers shall be wired to the temporary vertical studs or held in place by bracing to the floor.

The metal shall be rigidly wired to temporary studding with the side ribs interlocking and an end lap of not less than 1 inch. It shall also be attached to all columns, door and window framing and other permanent supports.

All side and end laps shall interlock and shall be securely laced with No. 16 gauge tie wire at intervals of about 12 inches, and the top and bottom sheets secured to floor and ceiling by the use of expanded metal angle or other methods as shown in details herewith. Side laps may be secured by clinching with a special punch as shown on page 7. (Note: Where they are erected vertically, sheets may be laid out and fastened together on the floor and raised to place five or six at a time). The partition is then ready for plaster.

The side opposite temporary studding shall be plastered first. Ordinary patent plasters can be used under certain conditions with good results, but if a cement plaster is used, the following has been found to be the most efficient mix: One part Portland cement, three parts sand and a small amount of hair, well tempered with lime mortar to set up hard and firm. This mortar is applied to a depth of ⅝ inch over the ribs of the metal and floated to an even surface.

After the first coat has set, the temporary studding is removed and the opposite side plastered in the same manner. The total thickness of the partition is approximately 2 inches. If thicker walls are desired, it is only necessary to apply additional coats of plaster until the required thickness is obtained. This thickness, however, should not exceed 3½ inches.

Where baseboards or picture mouldings are required, wood blocks the thickness of the plaster coat are wired to the Self-Sentering at the proper points before plastering, and the moulding or baseboard nailed to these blocks as shown.

Self-Sentering Curtain Walls

Manteca Sub-Station, Sierra & San Francisco Power Co.
Self-Sentering for Walls and Roof

Self-Sentering as a reinforcement for outside curtain walls of cement gives fireproof construction at a cost much less than that of tile, brick or poured concrete. The slabs are reduced to a minimum thickness, yet they are amply strong and rigid, due to the perfect distribution of the reinforcing metal. Unlike the other walls mentioned, they present a perfect finished appearance from the beginning and never require repairs. They cost somewhat more than the antiquated corrugated iron siding, but the rusting and the needed continual painting of the corrugated iron in a short time brings the cost far above that of the Self-Sentering wall.

Such walls are simply and quickly erected, no studding or form work being necessary. The sheets are merely set in place, securely fastened at top and bottom and at all laps and to such structural members as are necessary to support floor and roof. Cement plaster is then applied inside and out, and the walls are complete. Such construction is particularly adapted to all classes of industrial buildings.

Curtain Wall Specifications

Self-Sentering, as manufactured by The General Fireproofing Company, of Youngstown, Ohio, shall be used as a reinforcement for all

exterior curtain walls. Gauges to be used as indicated in the following table:

Spacing of Supports	Wall Thickness	Self-Sentering Gauge
6′	1¾″	28
8′	2″	28
10′	2½″	26
12′	2½″	26

Where supports are more than 6 feet apart, temporary bracing shall be provided on 6-foot centers to give a firm plastering surface until one side has been plastered.

Sheets to be securely fastened to columns and other permanent supports at intervals not to exceed 7¼ inches, the ribs running in the direction of the shortest span.

Where structural supports are used, Self-Sentering shall be attached by special clips (which can be secured from manufacturers) or by wiring; if of wood, staples shall be used; if of reinforced concrete, any method shown in the details herewith may be used.

Side ribs of all sheets shall be securely interlocked and wired together with No. 16 gauge tie wire at intervals not to exceed 1 foot, or these laps may be secured by clinching with a special punch. The ends of sheets should lap 6 inches if laps occur between supports and not less than 1 inch if over supports. Laps between supports must be properly staggered.

Plastering

A scratch coat shall be applied on the outside first and shall consist of one part Portland cement to three parts of clean, sharp sand, with a small amount of hair and only enough lime paste to insure a smooth working mortar (preferably about one-tenth by volume). This coat shall be ⅜ inch over the ribs and well worked into the mesh to properly bind on the inner side. When partly set, this coat shall be well scratched to receive the finish coat.

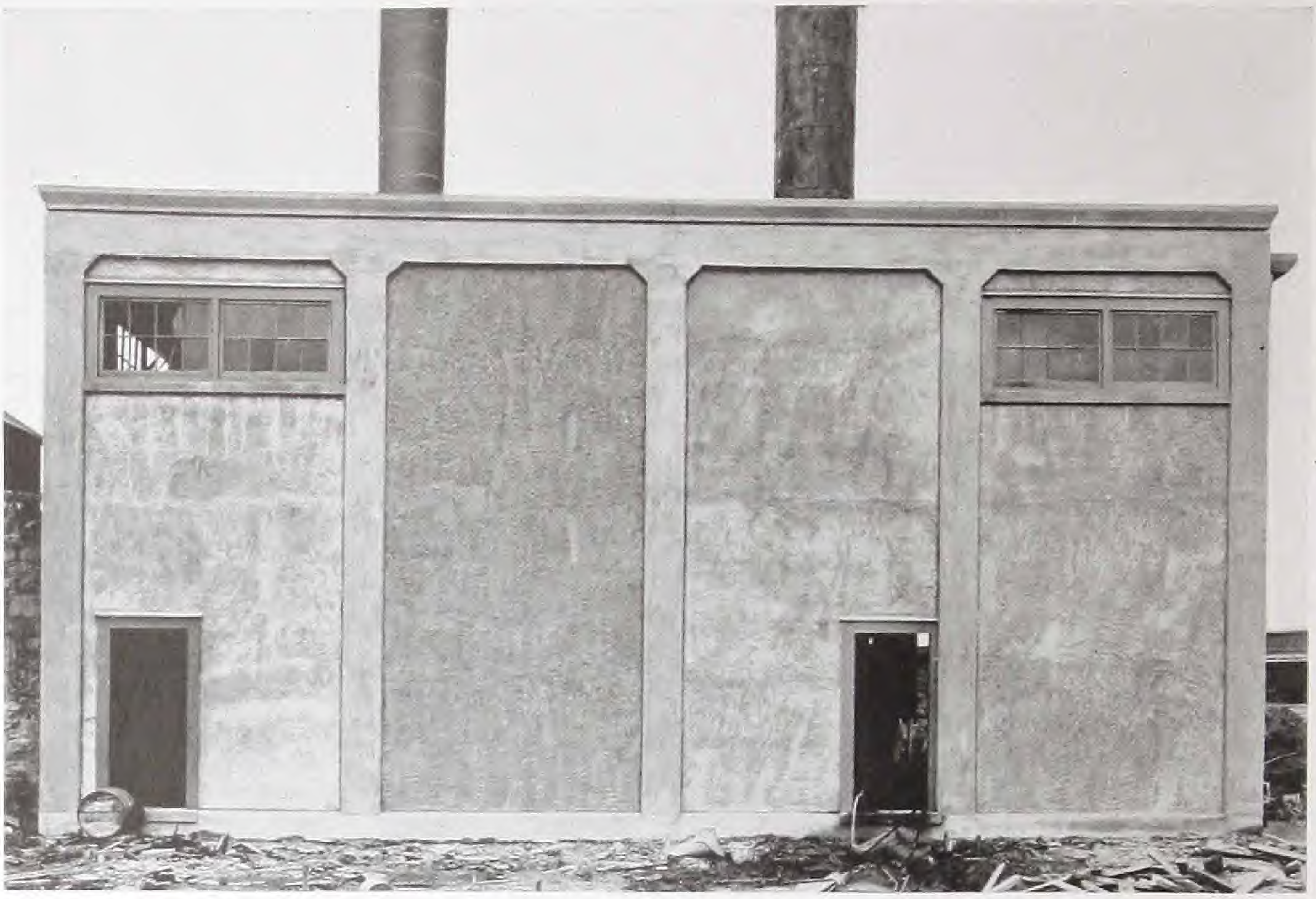
When the first coat has set, any temporary bracing shall be removed and the inside coat applied of the same mix as for the exterior and shall cover the ribs about ¼ inch.

The finished outside coat shall then be applied of equal parts of Portland cement and clean, sharp sand. If desired, some form of integral waterproofing may be mixed with the finish coat.

If a thicker wall is required, another inside coat may be added, using the same mix as for the first two coats. This may be varied by using coloring matter, white cement, or white sand to give a more pleasing appearance.

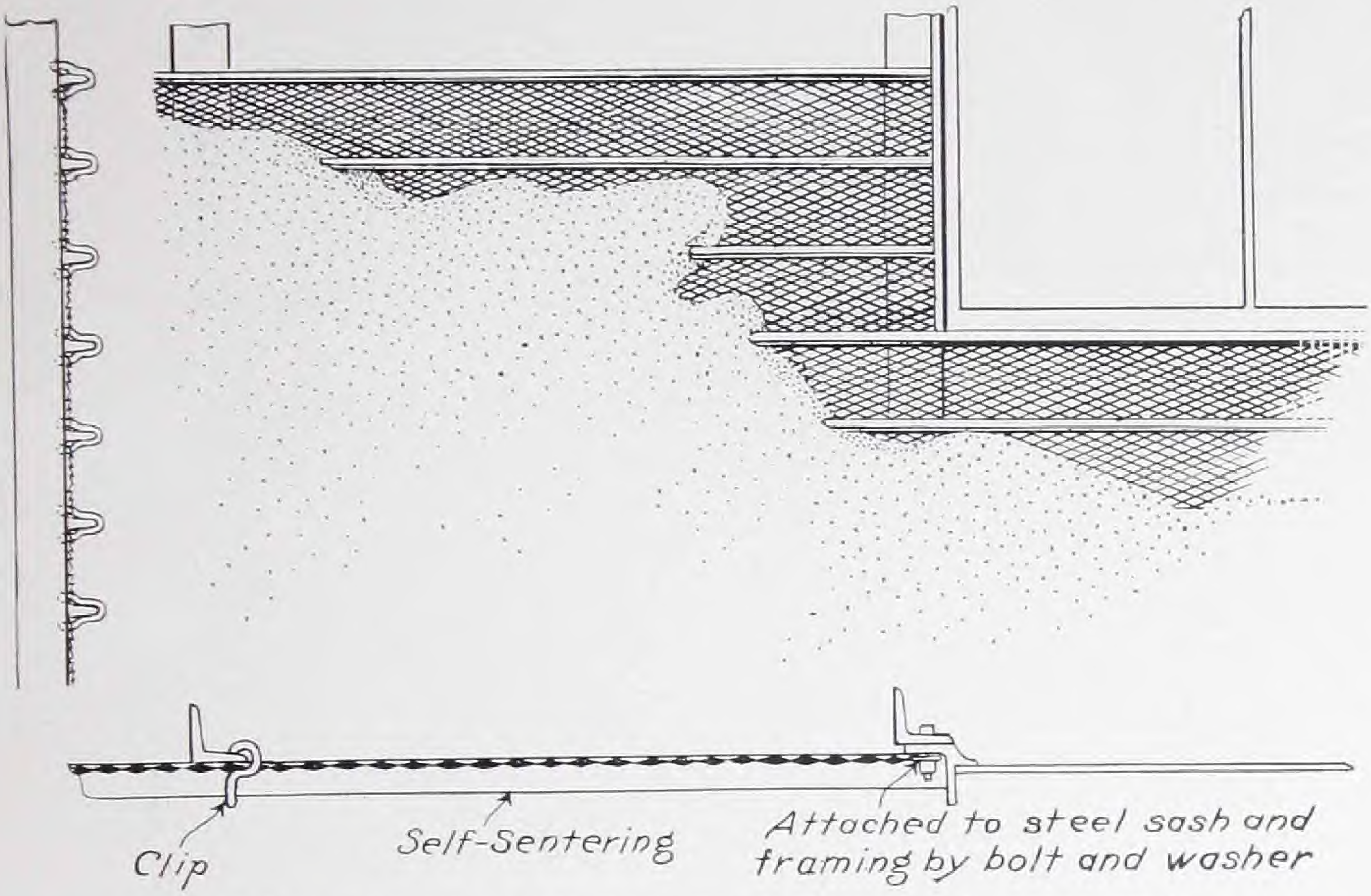
The outside coat may also be varied in the same manner, if desired.

The finished work shall be protected from too rapid setting by wind or sun for several days, either by spraying or by hanging wet burlap curtains in front of the wall.

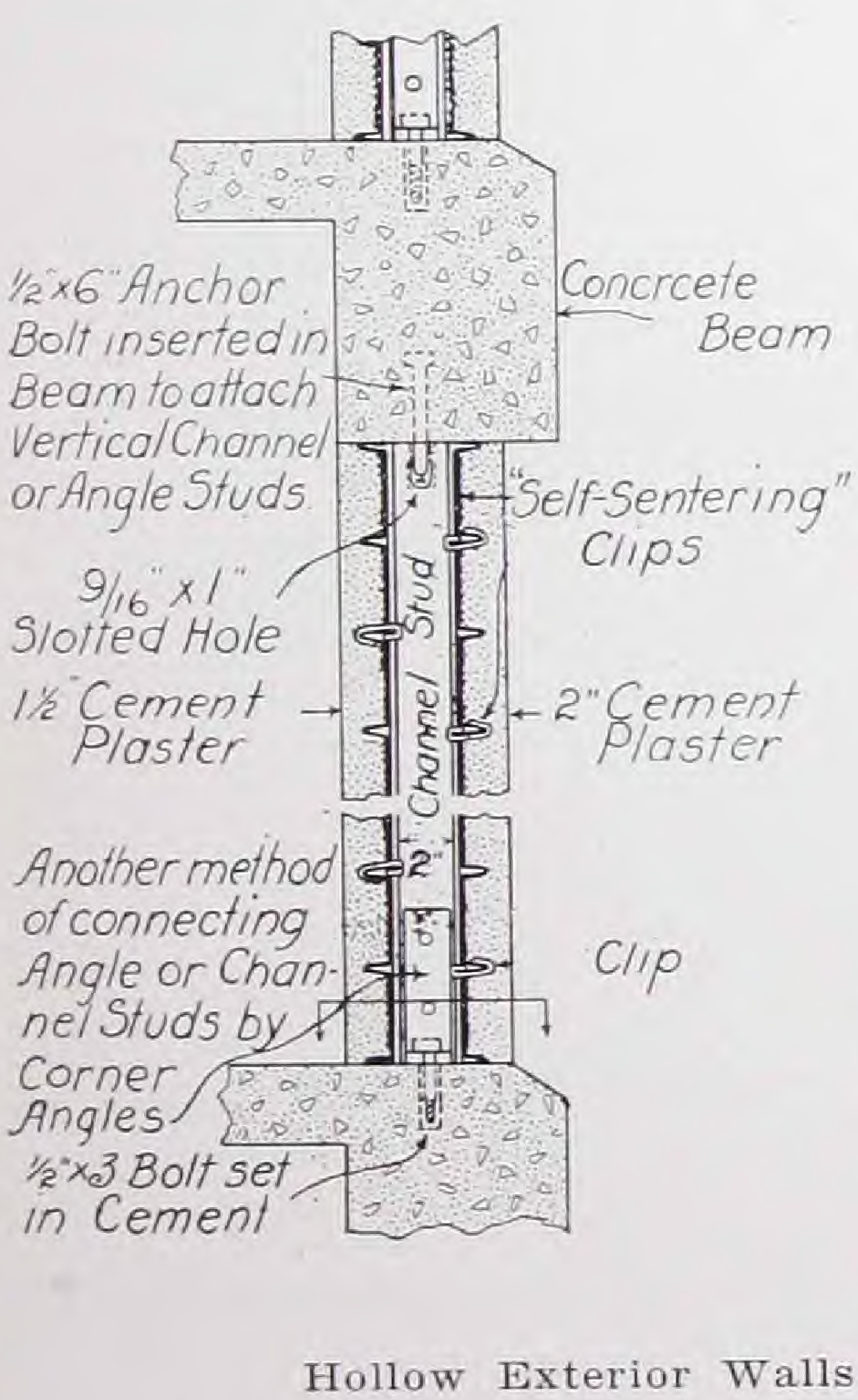


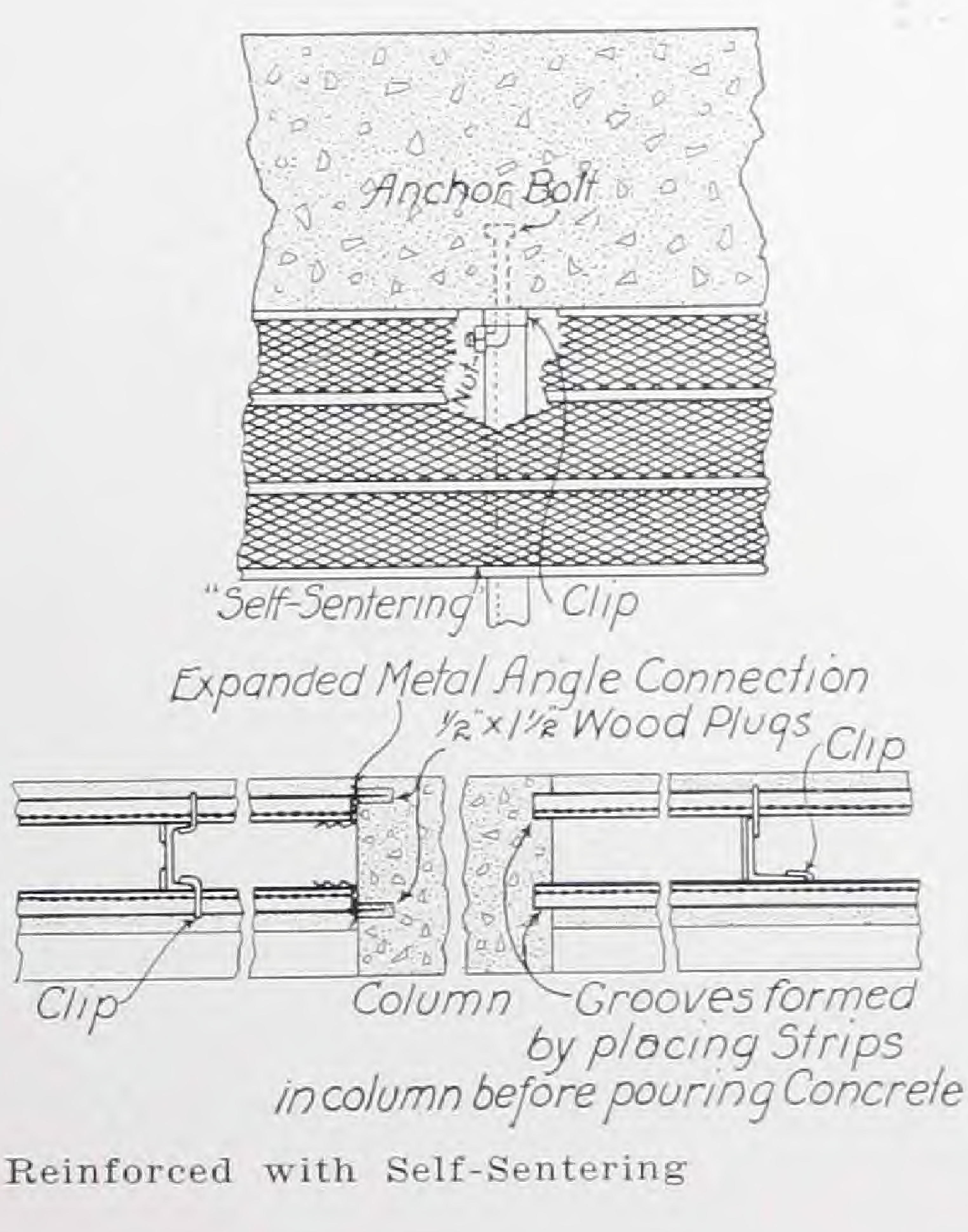
Lighting Plant, Ada, Oklahoma
Self-Sentering Walls and Roof

Finished Building for Archer Rubber Company, Milford, Mass.
Self-Sentering Walls

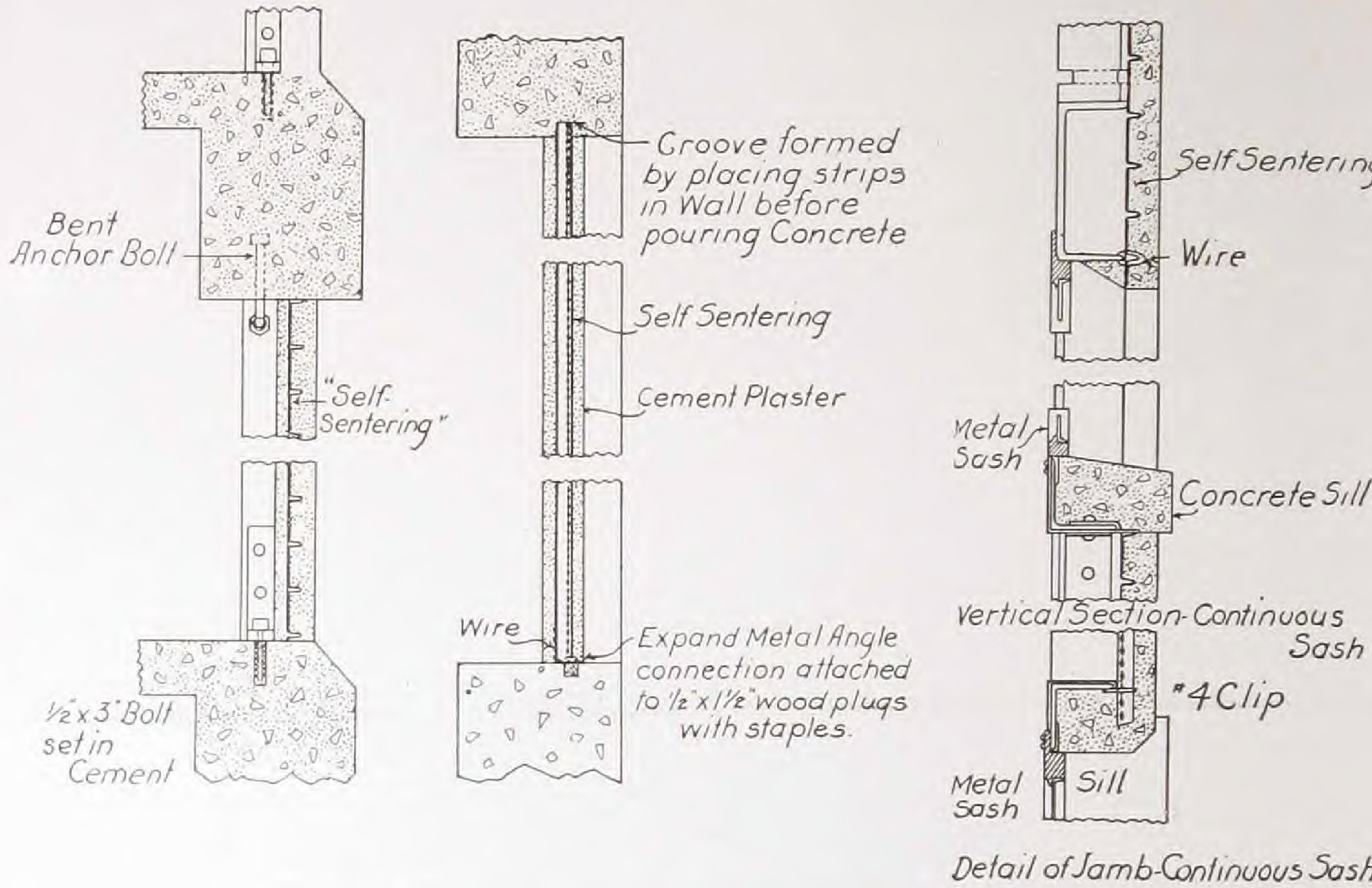


Self-Sentering as Applied to Steel Framing for Side Walls

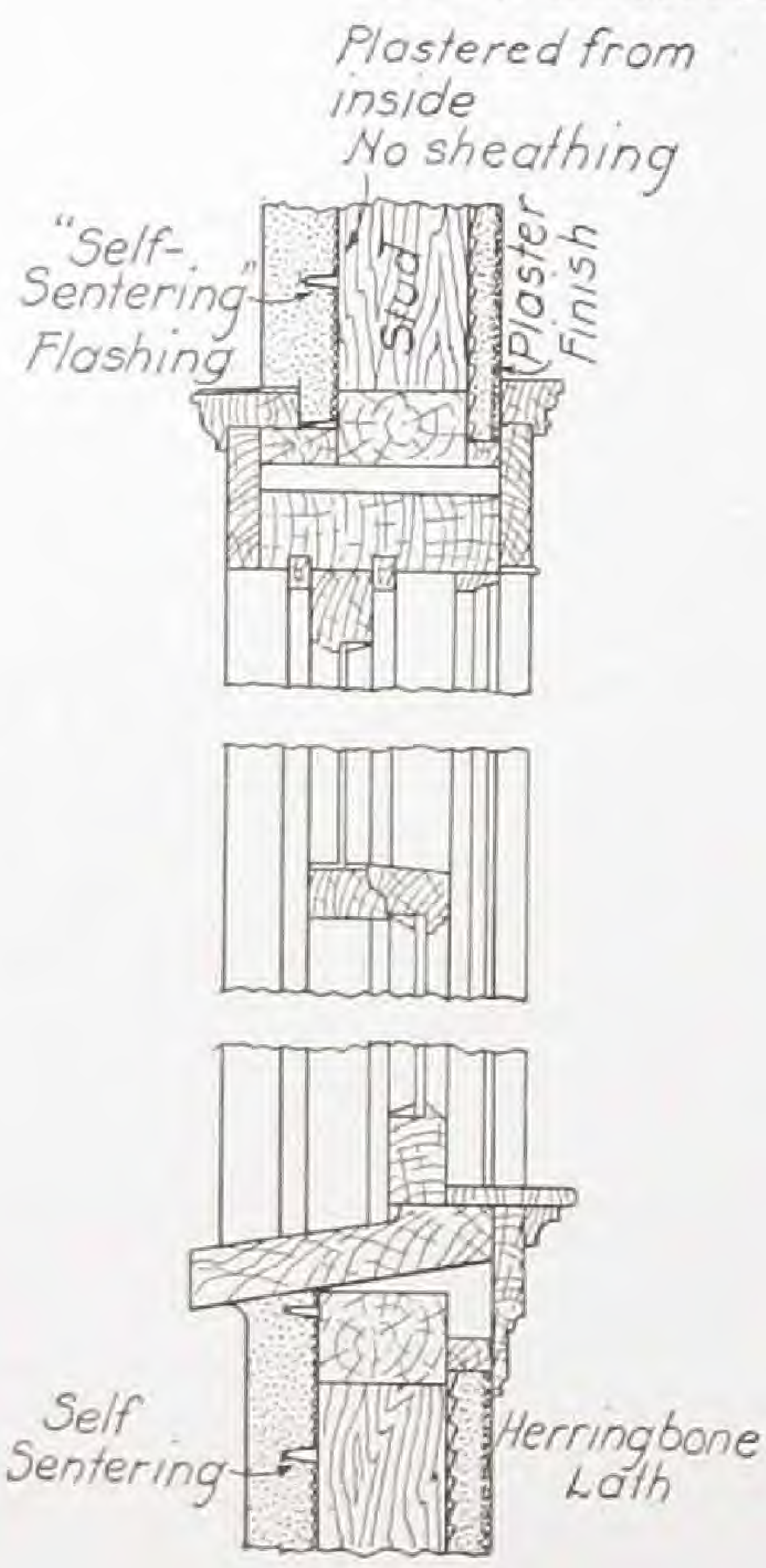




Hollow Exterior Walls Reinforced with Self-Sentering

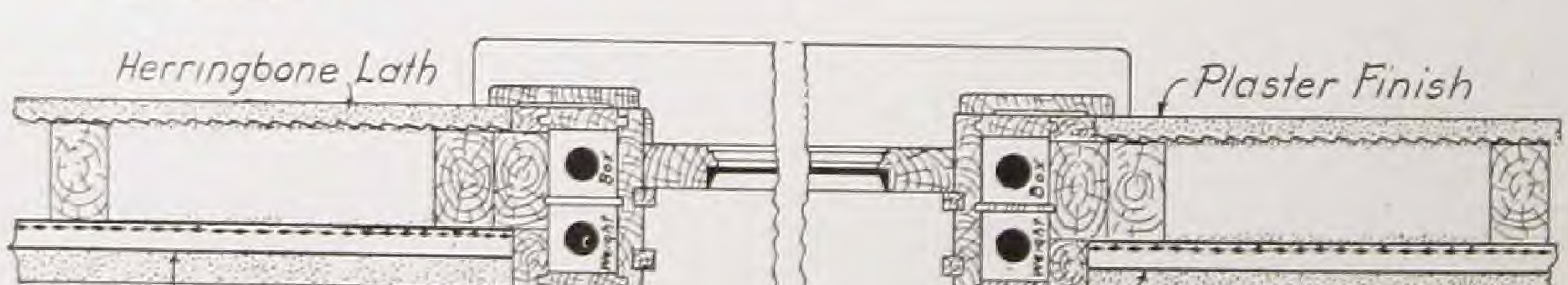


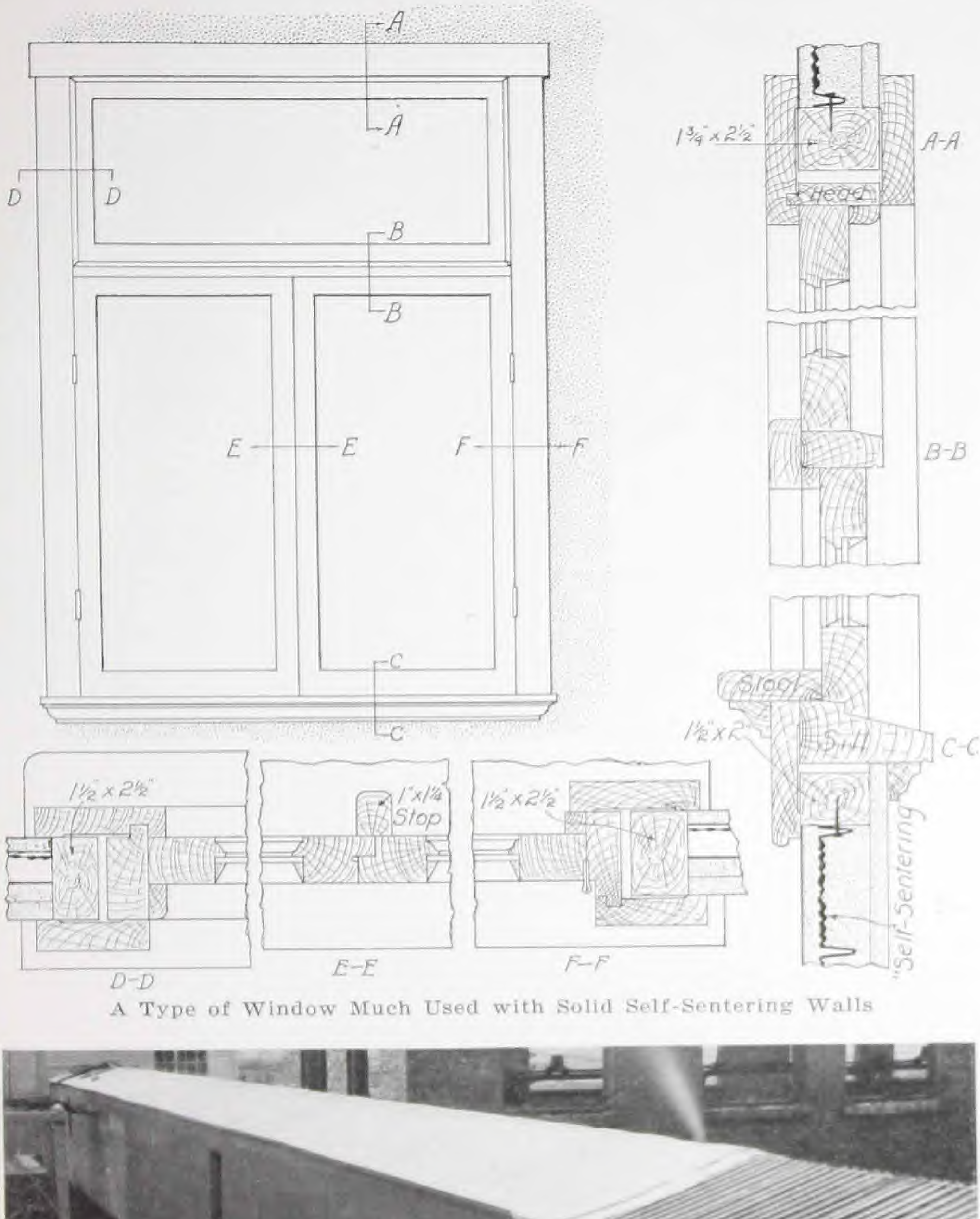
Solid Exterior Walls Reinforced with Self-Sentering



Hollow Self-Sentering Walls on Wood Framing

Particularly suited for high grade residence construction, giving, with its 2-inch cement slab, the most durable type of stucco work.

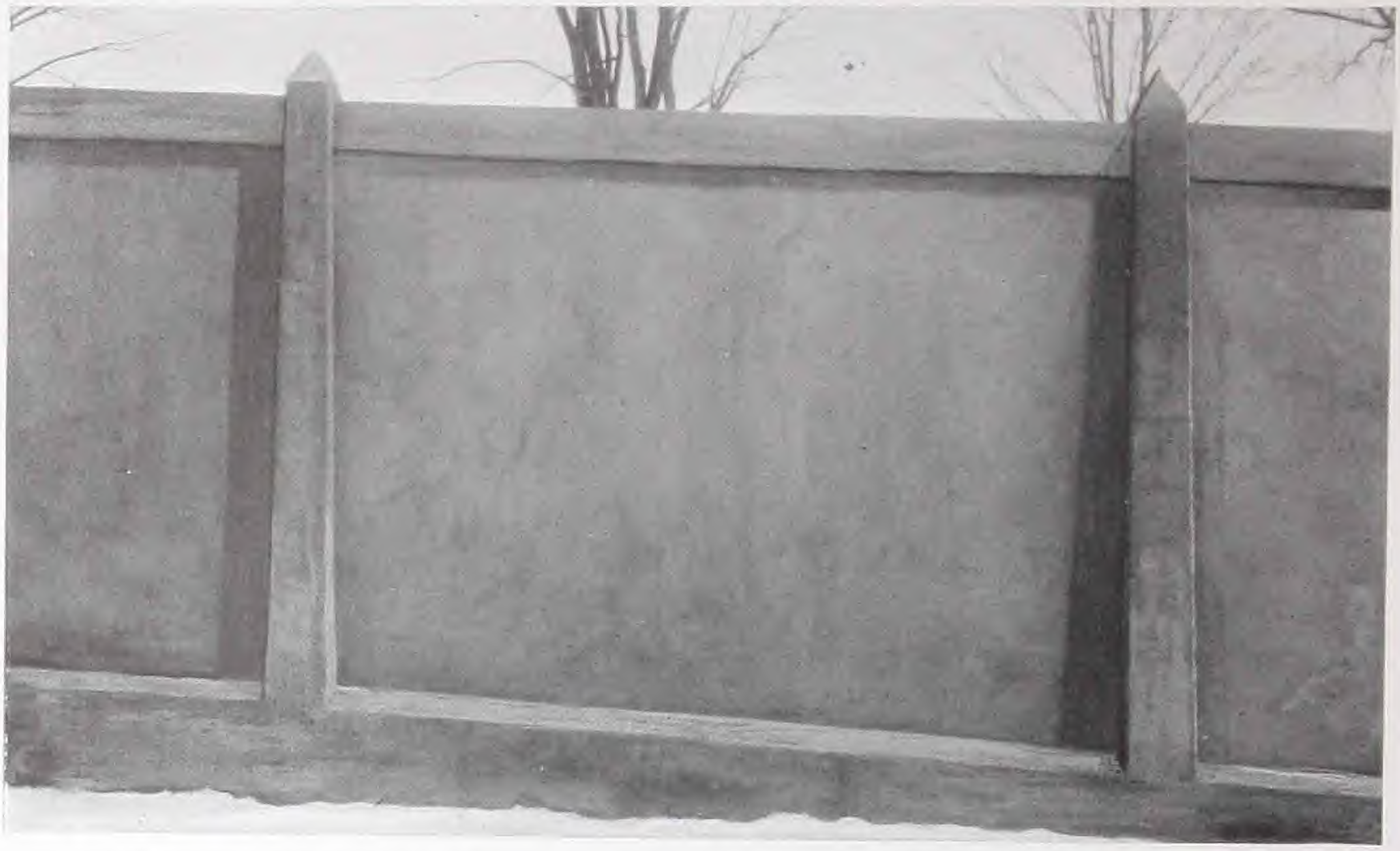




A Type of Window Much Used with Solid Self-Sentering Walls

Conveyor for Lake Superior Paper Co., Sault Ste. Marie, Ont.
Self-Sentering Walls and Roof

Self-Sentering Fences and Railings



Concrete Fence, Athletic Field, Allegheny College, Meadville, Pa.

The Self-Sentering fence, while chiefly used for the enclosure of athletic fields, ball parks, amusement parks, etc., is very well adapted for private use, or in fact, any place where a permanent fence is required or where an attractive appearance will be appreciated.

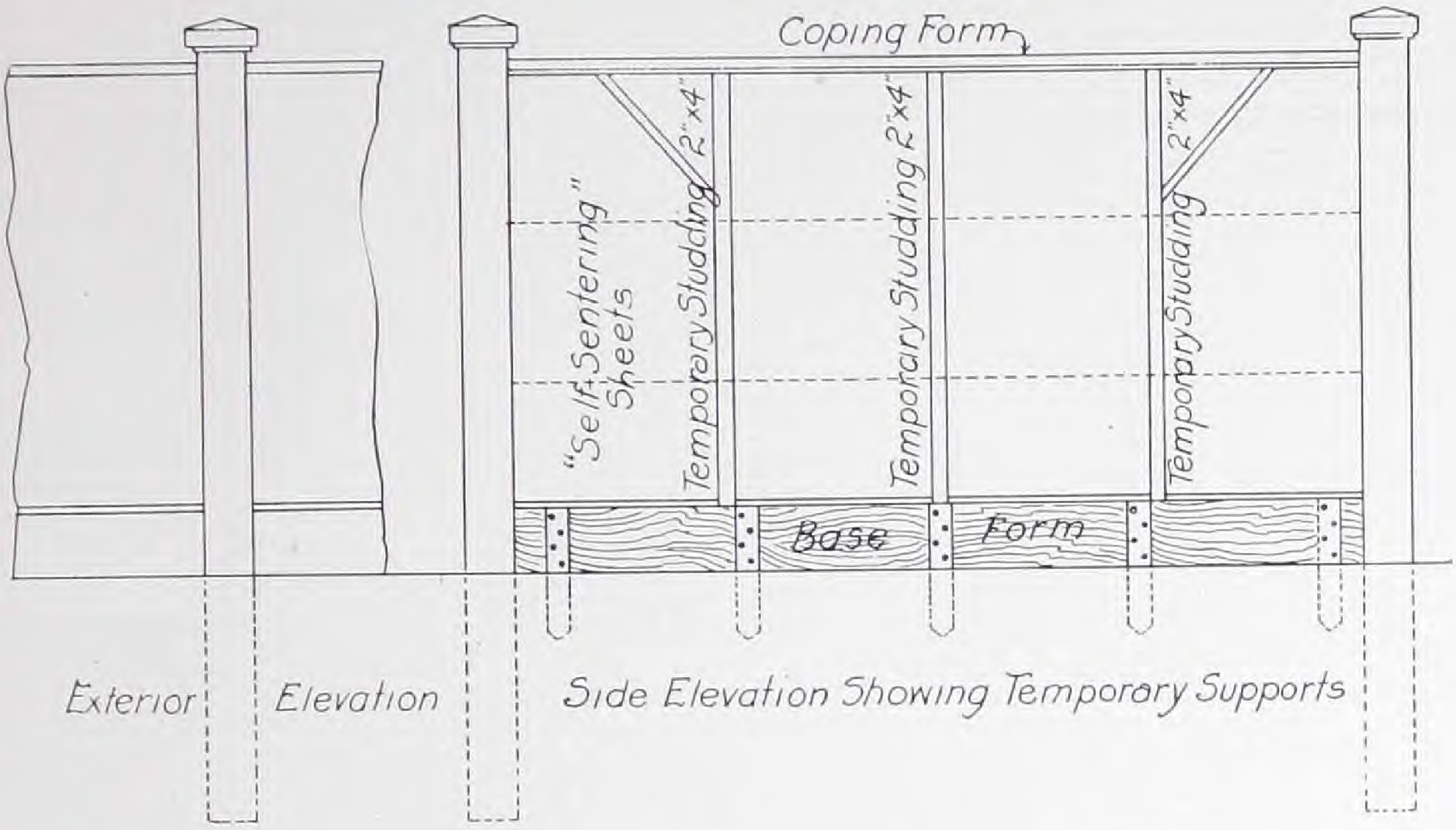
Such a fence is made from Self-Sentering, plastered on both sides with cement mortar in the same manner as for exterior walls. The posts may be made from Self-Sentering with ribs running vertically and the sheets curved or bent to the form of post desired; plastered on the outside and filled with concrete.

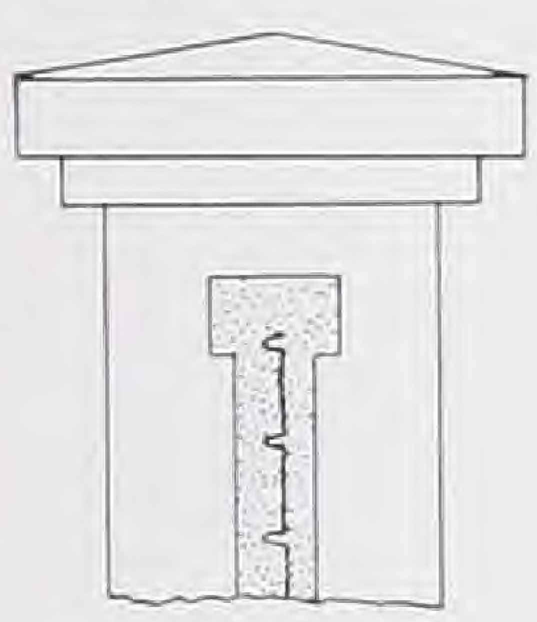
This fence, properly constructed, never requires repairs or painting and gives an appearance of age and stability only equalled by the old-time stone wall, the cost of which is prohibitive in most cases.

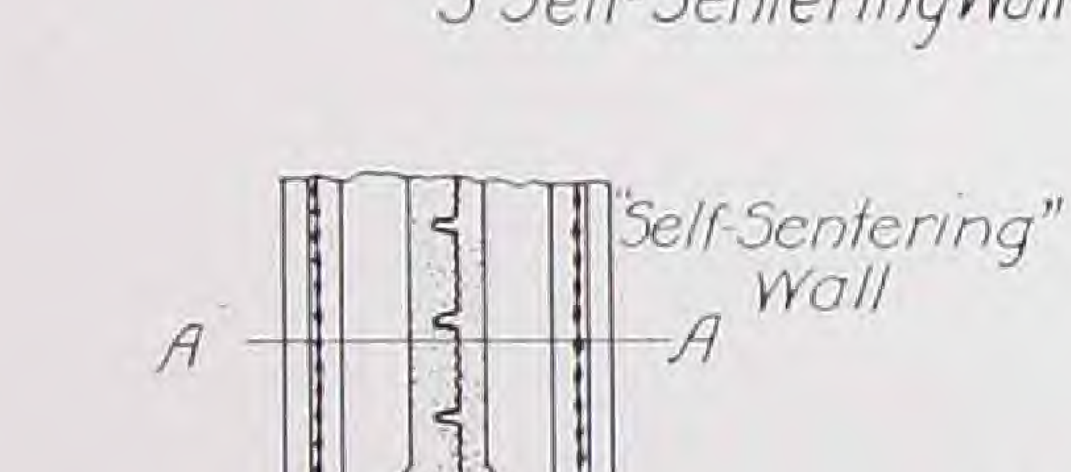
Self-Sentering railings for bridges and inclined runways are made in the same manner and the fact that they are built without forms of any kind makes them much less expensive than the ordinary concrete railings used for this purpose.

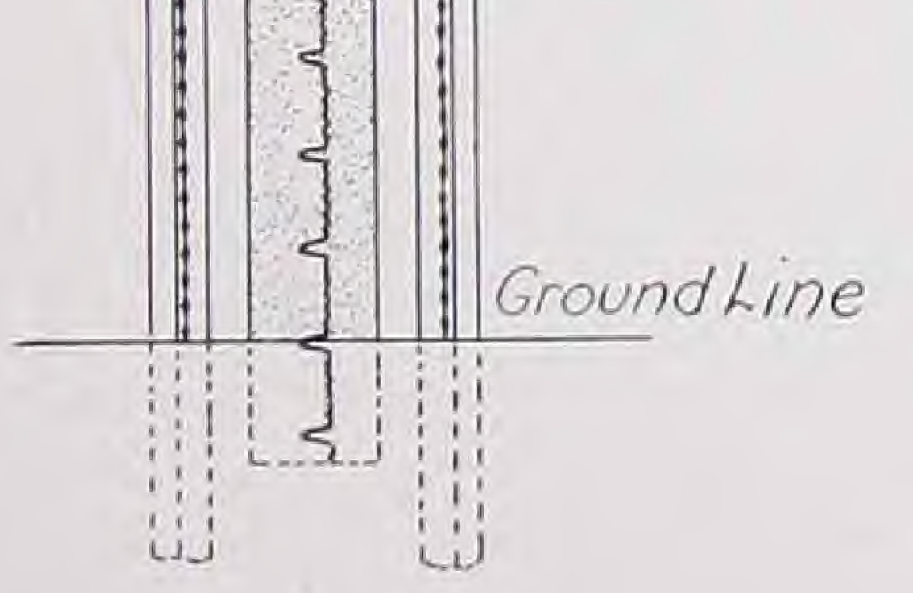
Details of Self-Sentering Fence

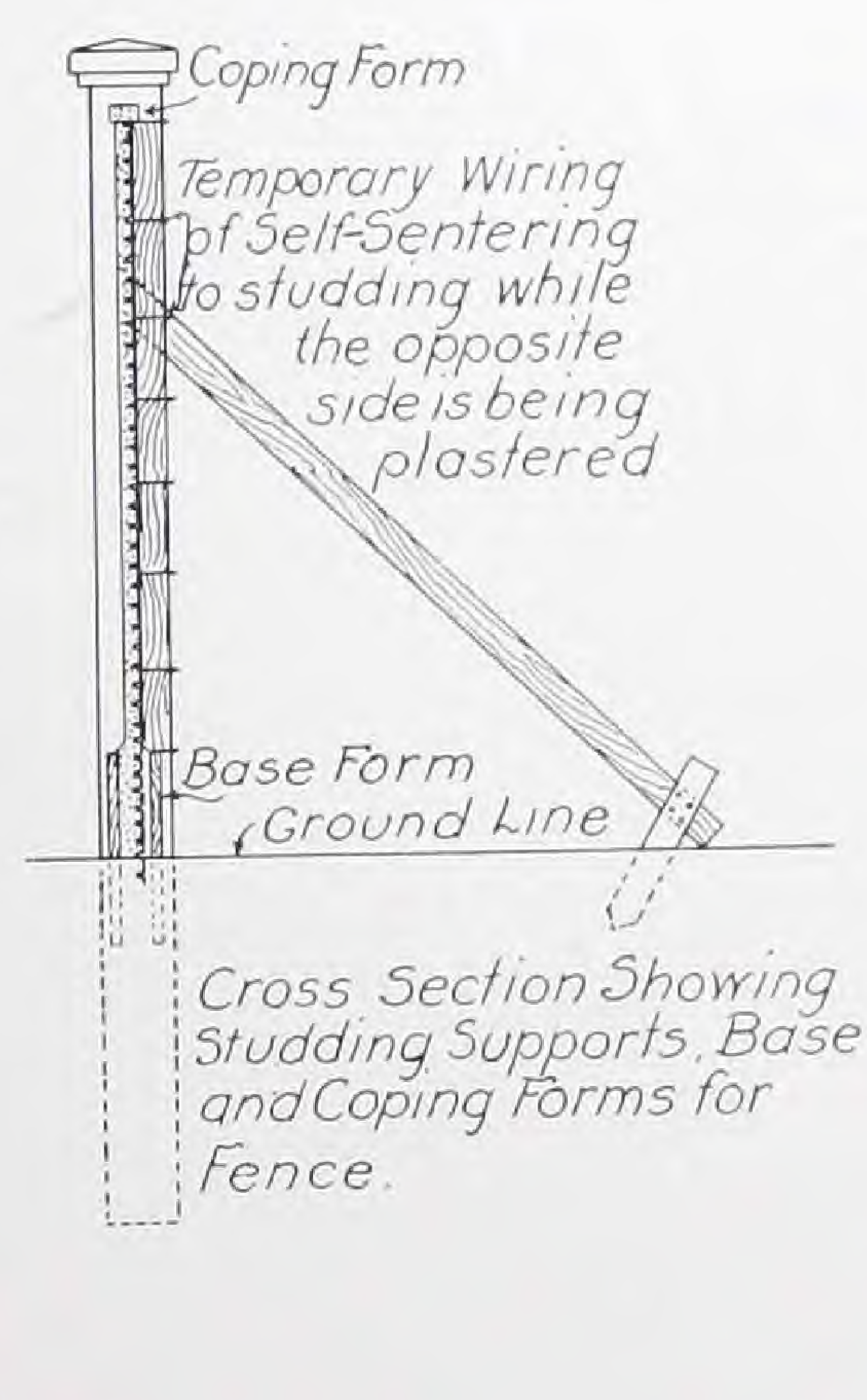
Self-Sentering used for Panels and Posts

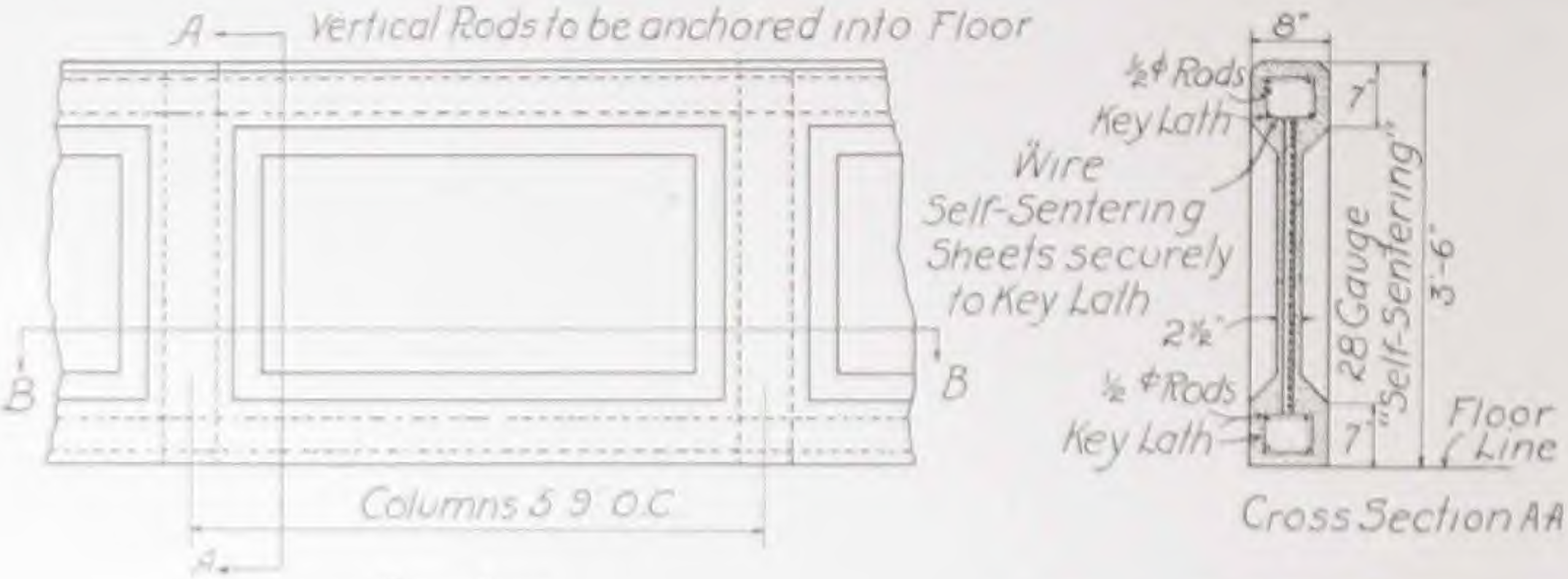












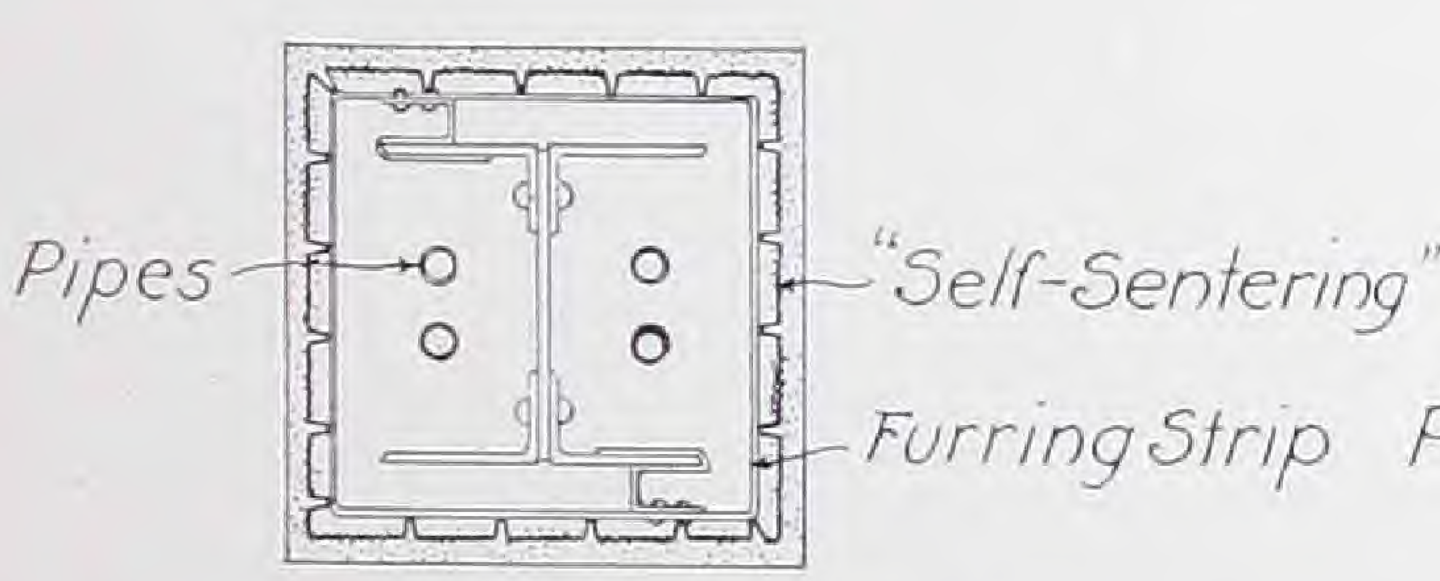
Detail of Self-Sentering Railing for Runways or Bridges

Fan and Engine House, The Columbus Iron & Steel Co., Marting, W. Va. Showing adaptability of Self-Sentering to complicated work. Efficient fireproof construction secured at low cost, no forms whatever being required.

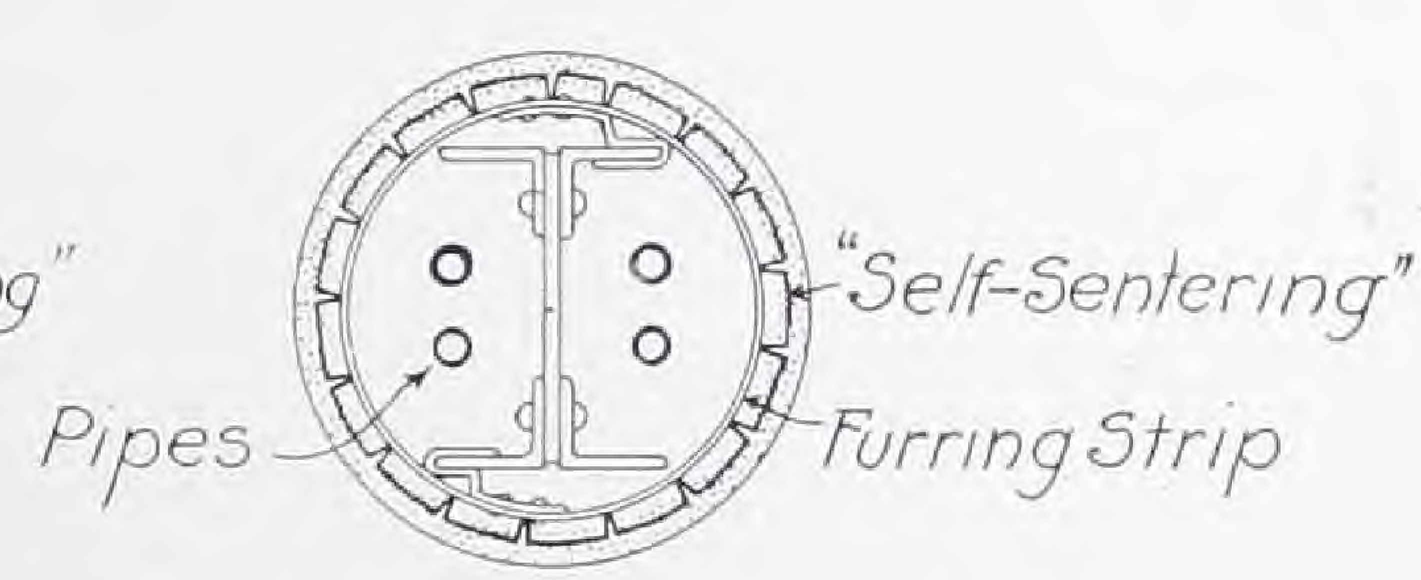
Self-Sentering for Beam and Column Protection, False Columns and Posts

In the fireproofing of steel columns and beams, the heavy ribs of Self-Sentering placed against the structural members act as furring strips to give the necessary air space, while the tough, pliant nature of the connecting mesh permits the material to be easily worked and formed to the required outline. The mesh forms a perfect plastering surface and the ribs, in addition to taking the place of furring strips ordinarily required, because of their close spacing ($3\frac{5}{8}$ inches center to center) give the strength necessary to safely support the heavy plaster load which should be used.

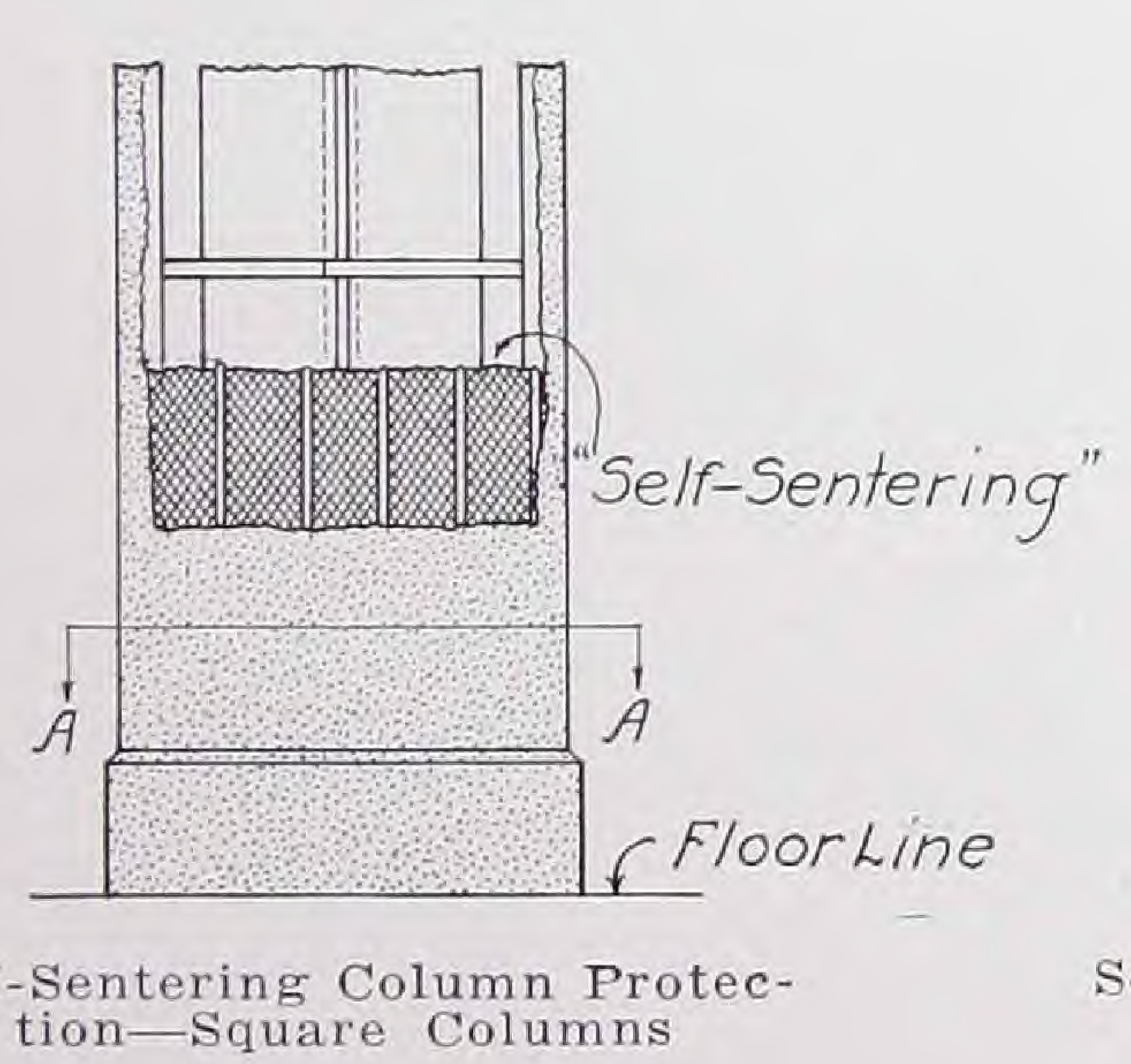
In the construction of posts and false columns, Self-Sentering can be folded to the desired shape (see detail of fence posts on page 71) stood on end, secured in place and plastered without other supports. For posts, this shell can be filled with concrete after the plaster has set. The absence of forms for such work will be found to effect a considerable saving, while the finished appearance will be far superior to the poured type.



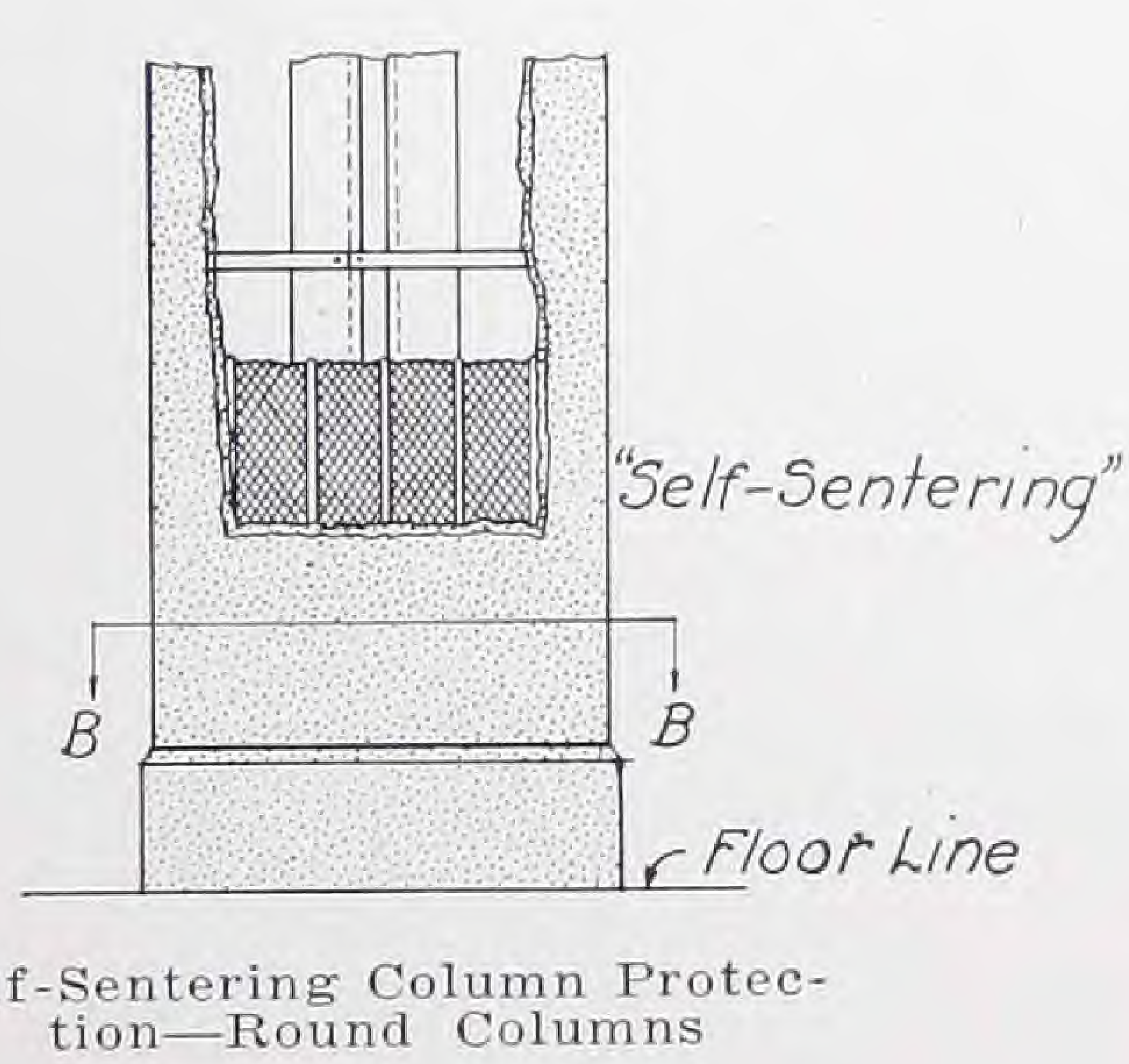
Cross Section A–A



Cross Section B–B

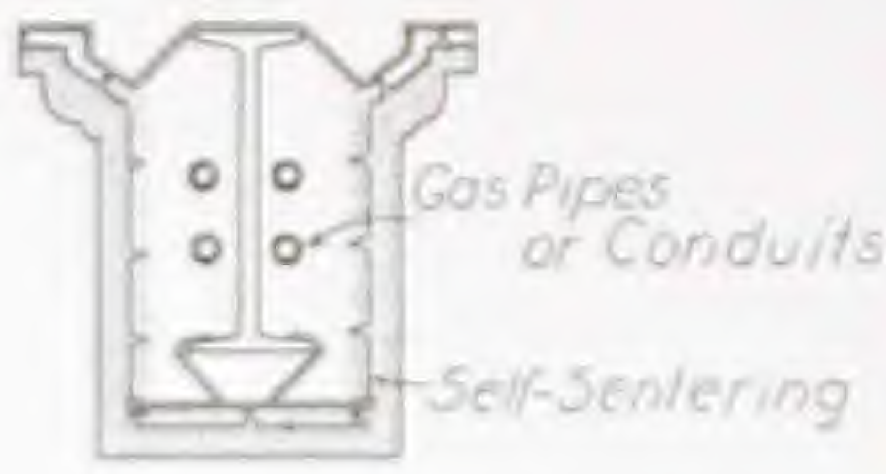


Self-Sentering Column Protection—Square Columns



Self-Sentering Column Protection—Round Columns

For false beam work, Self-Sentering takes the place of both lath and furring. The only framing required will be the brackets to give the desired shape to the beams. These brackets on straight work can be spaced in the same manner as the supports for suspended ceilings. (See specifications, page 49). Heavy plaster loads are entailed by the decorative effect brought out in false beam work and Self-Sentering with its closely spaced, heavy ribs affords the best carrying surface to support this load. Its perfect flexibility makes it easily shaped to conform to the curves and angles necessary with no danger of fracture of the metal.



Detail showing False Beam Construction

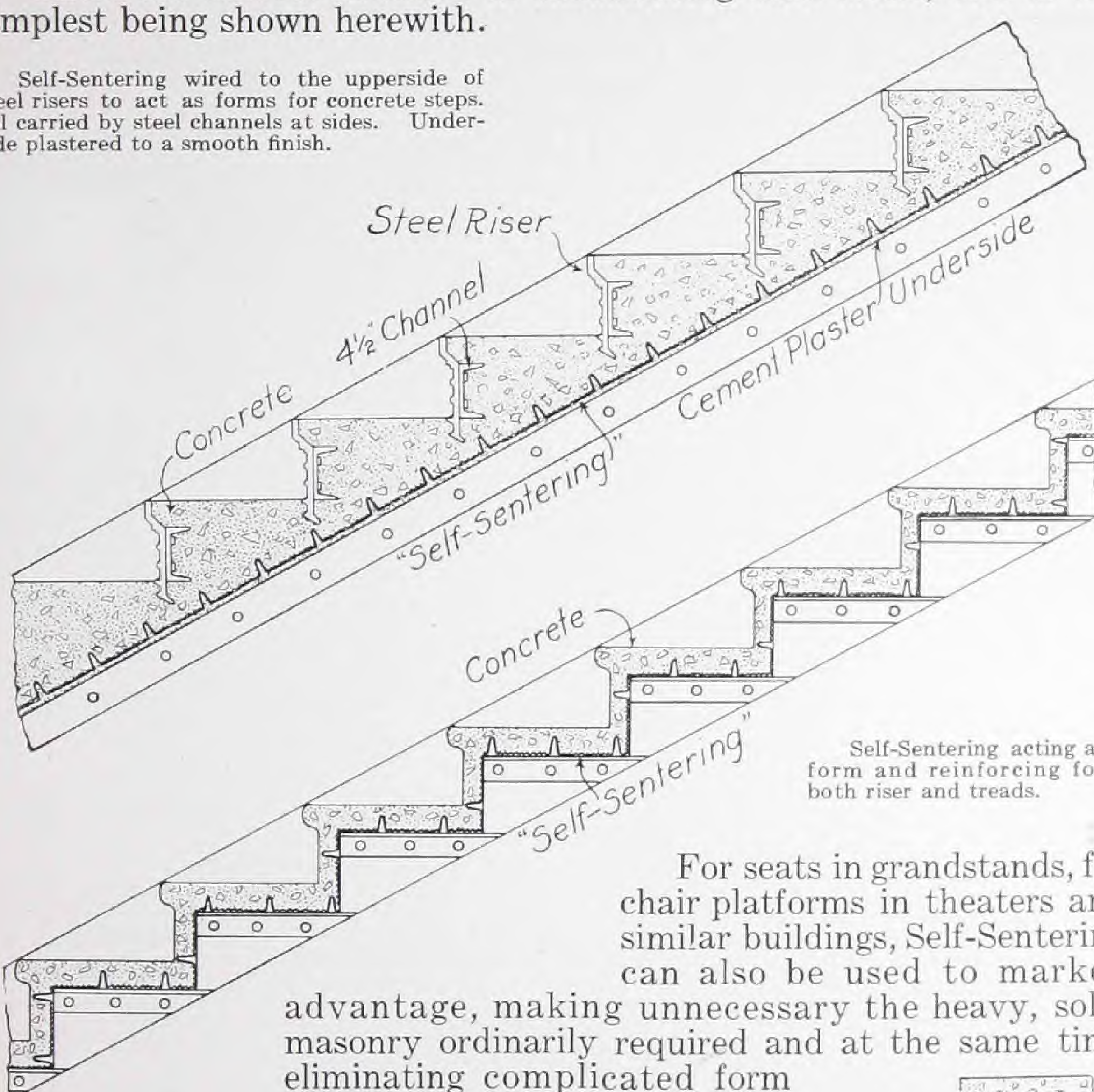
Showing novel use of Self-Sentering. This is the artistic, fireproof office of Architects Price, Broadwell & Mahan, Memphis, Tenn., erected on top of one of the prominent office buildings.

Self-Sentering for Steps, Stairs and Seat Risers

The false work ordinarily required for concrete stairs is one of the most expensive classes of form work required and the use of Self-Sentering as a reinforcement does away with this expense entirely.

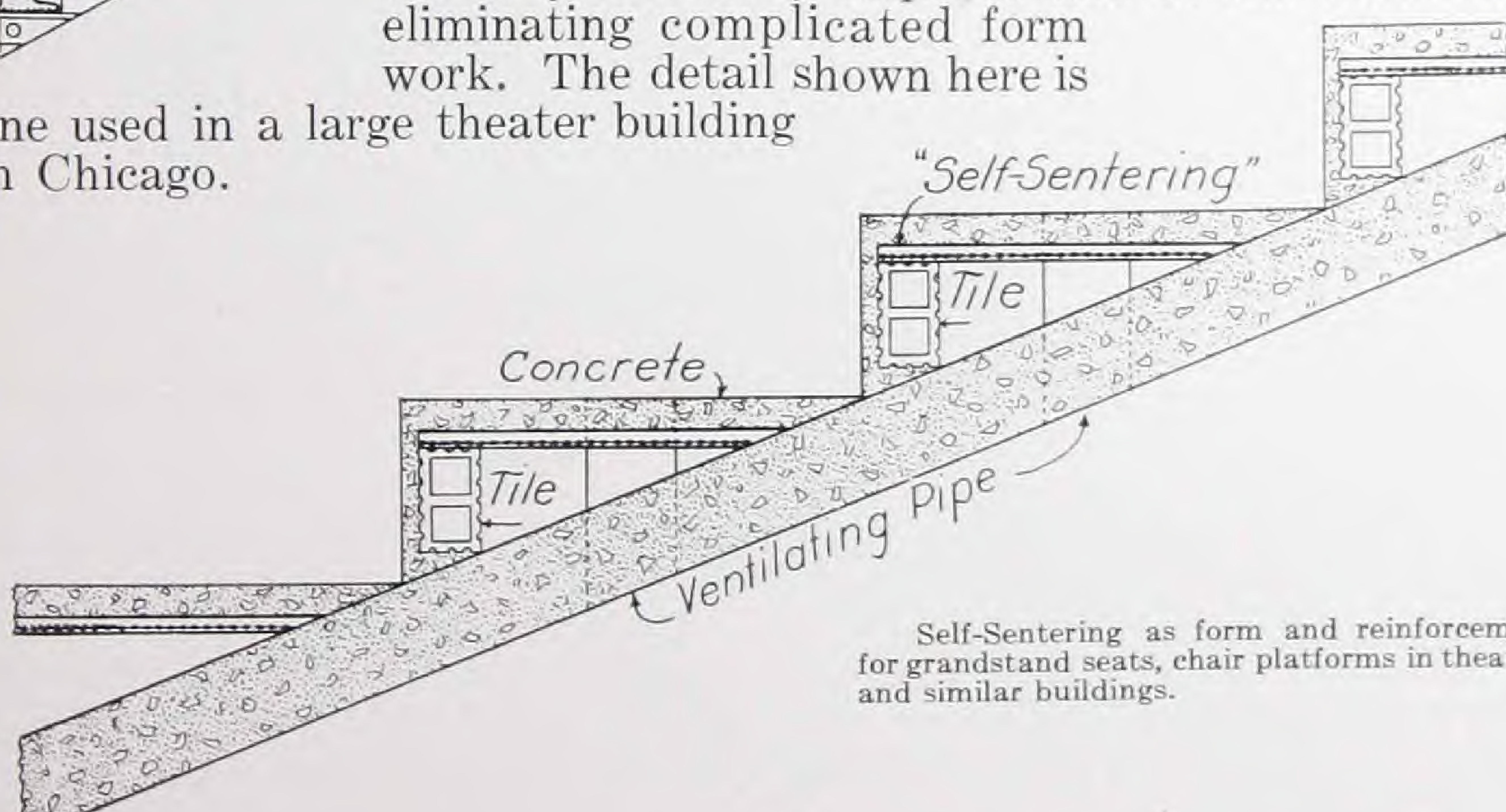
There are several methods of constructing such stairs, two of the simplest being shown herewith.

Self-Sentering wired to the upperside of steel risers to act as forms for concrete steps. All carried by steel channels at sides. Underside plastered to a smooth finish.



Self-Sentering acting as form and reinforcing for both riser and treads.

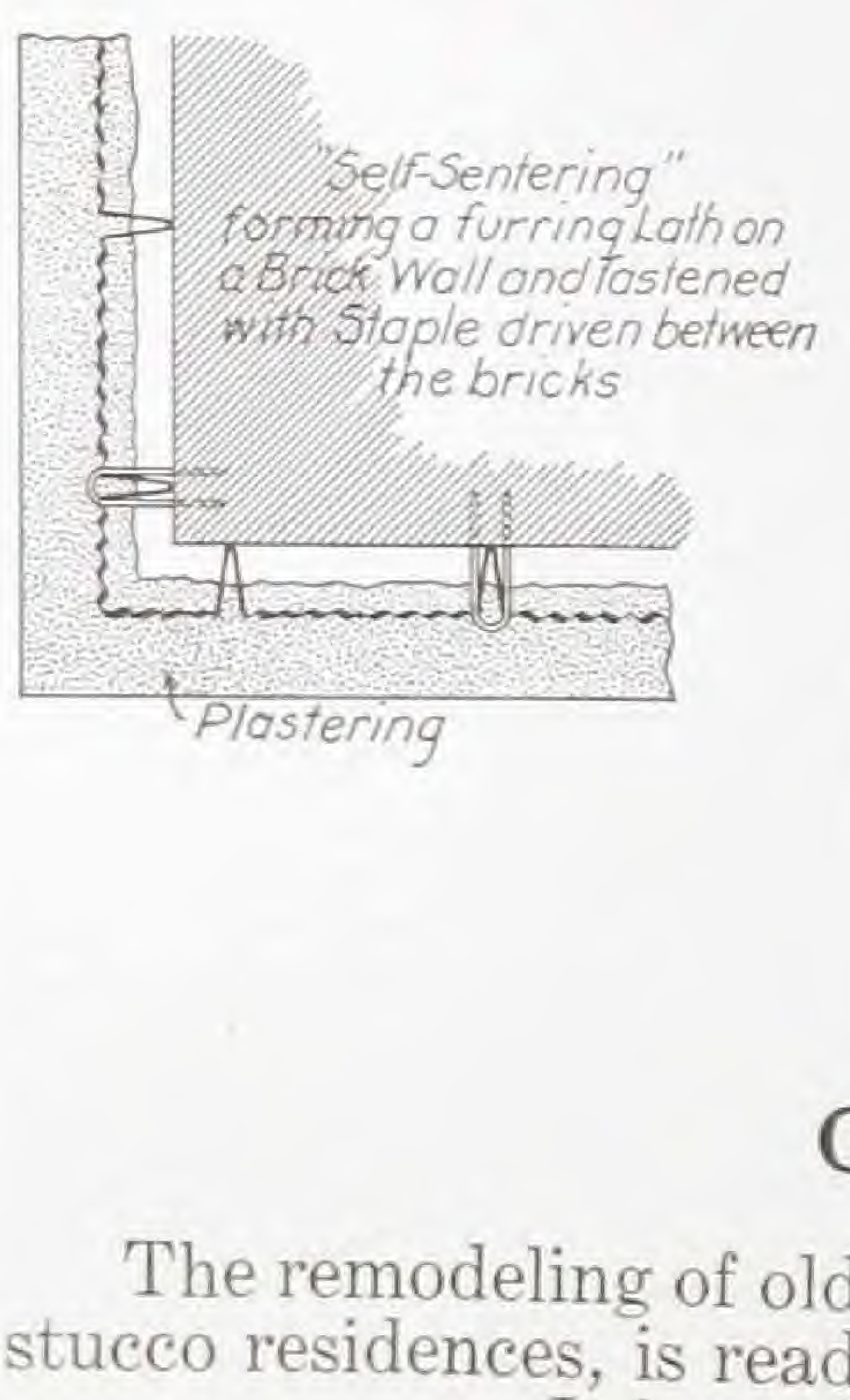
For seats in grandstands, for chair platforms in theaters and similar buildings, Self-Sentering can also be used to marked advantage, making unnecessary the heavy, solid masonry ordinarily required and at the same time eliminating complicated form work. The detail shown here is one used in a large theater building in Chicago.

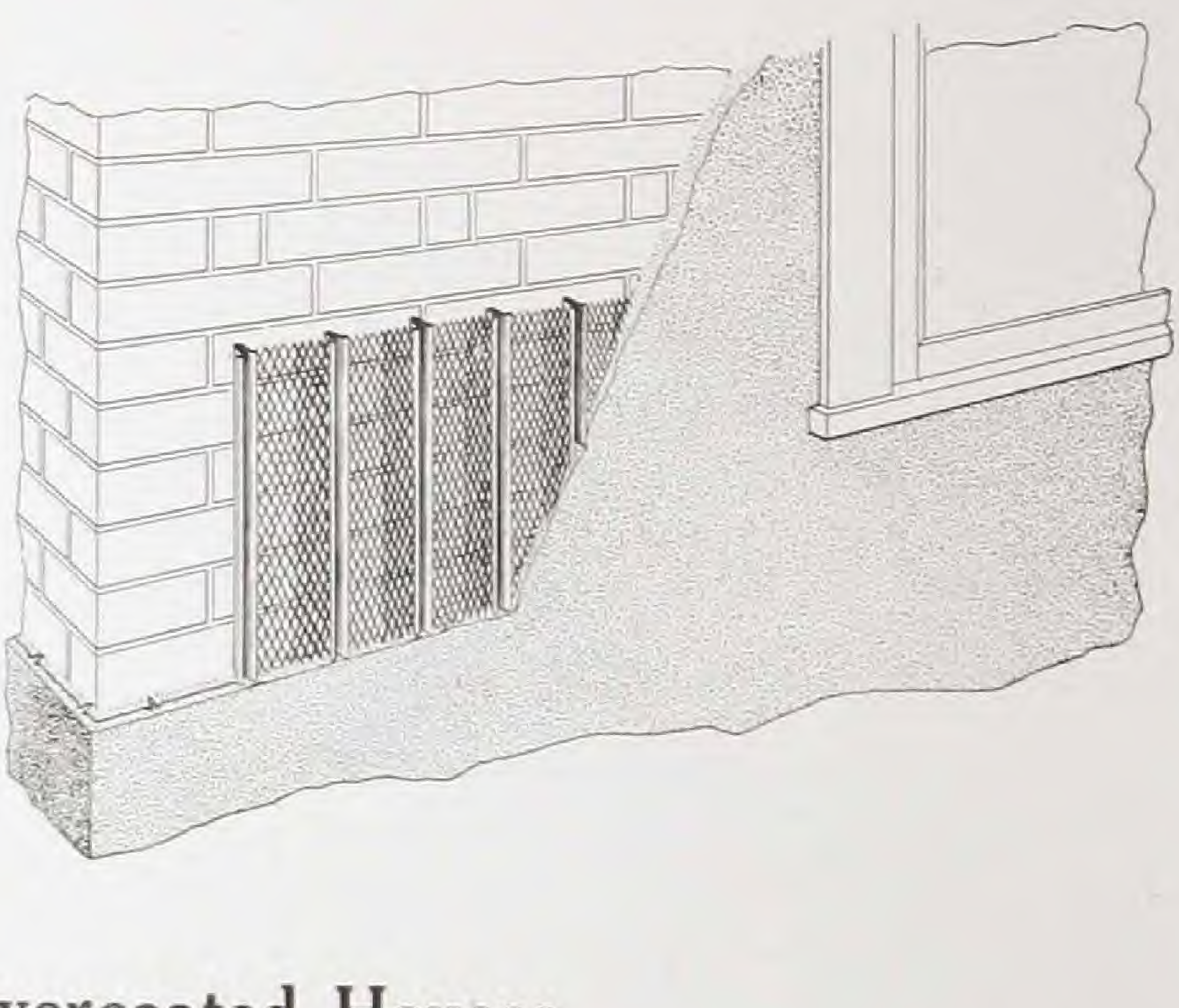


Self-Sentering as form and reinforcement for grandstand seats, chair platforms in theaters and similar buildings.

Self-Sentering for Outside Stucco Work

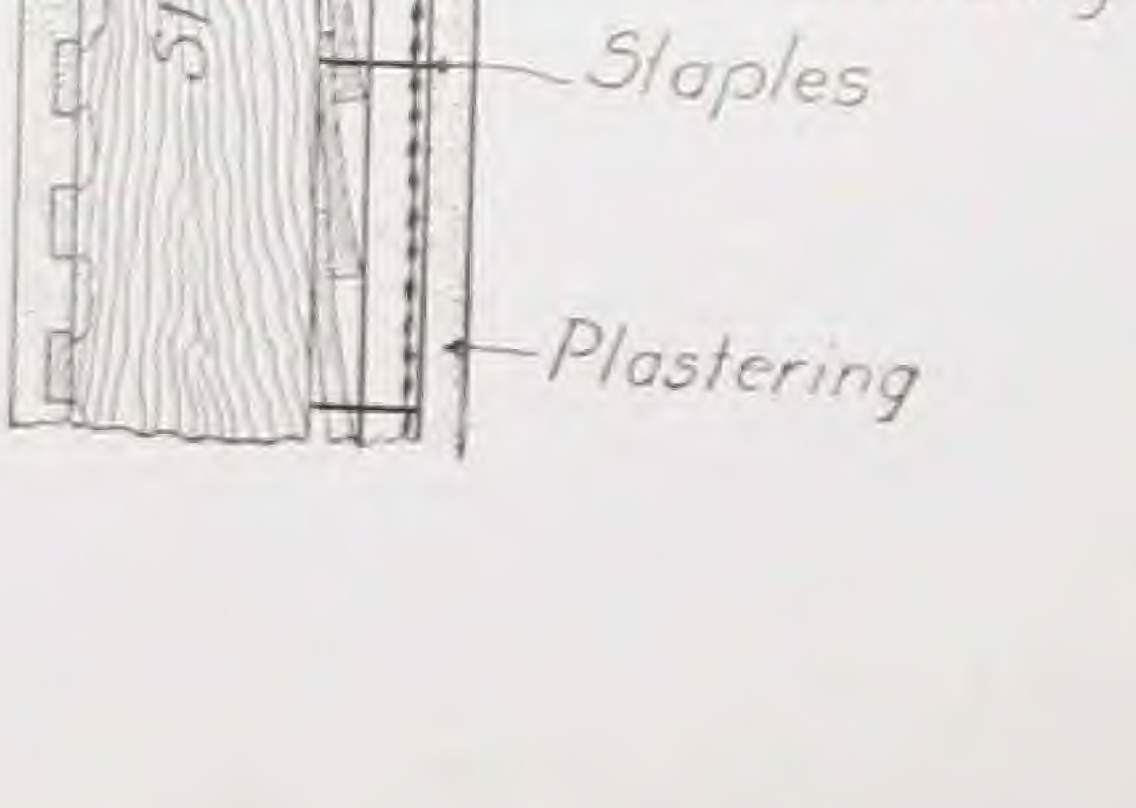
For stucco work on residences, Self-Sentering acts as both lath and furring. It is applied with the heavy ribs against the sheathing with the lath surface out. These heavy ribs give a large air space to act as insulation and hold the cement plaster away from the wood. This prevents the too rapid absorption of moisture by the wood from the plaster. Because of the close spacing of these heavy ribs ($3\frac{5}{8}$ inches center to center) an unusually firm surface is afforded for the mortar, insuring a coating of uniform thickness with consequent freedom from danger of expansion cracks. Self-Sentering also affords the great strength necessary to carry the heavy load of mortar which first-class stucco work demands.





Overcoated Houses

The remodeling of old frame houses, transforming them into modern stucco residences, is readily accomplished by the use of Self-Sentering. It is applied in the same manner as over-sheathing on new stucco work, ribbed side being placed against the old walls and securely fastened by staples. Old trim is either removed and plastered corners substituted, or is blocked out to correspond with the increased thickness of the wall.



Cement plaster should be applied to Self-Sentering to a thickness of at least 1 inch, preferably more.

The value of a residence thus remodeled, at a very low cost, will be greatly increased and the rejuvenated building will present a very attractive appearance, as the lines of the old-fashioned frame houses lend themselves very readily to this type of construction.

Self-Sentering Residences

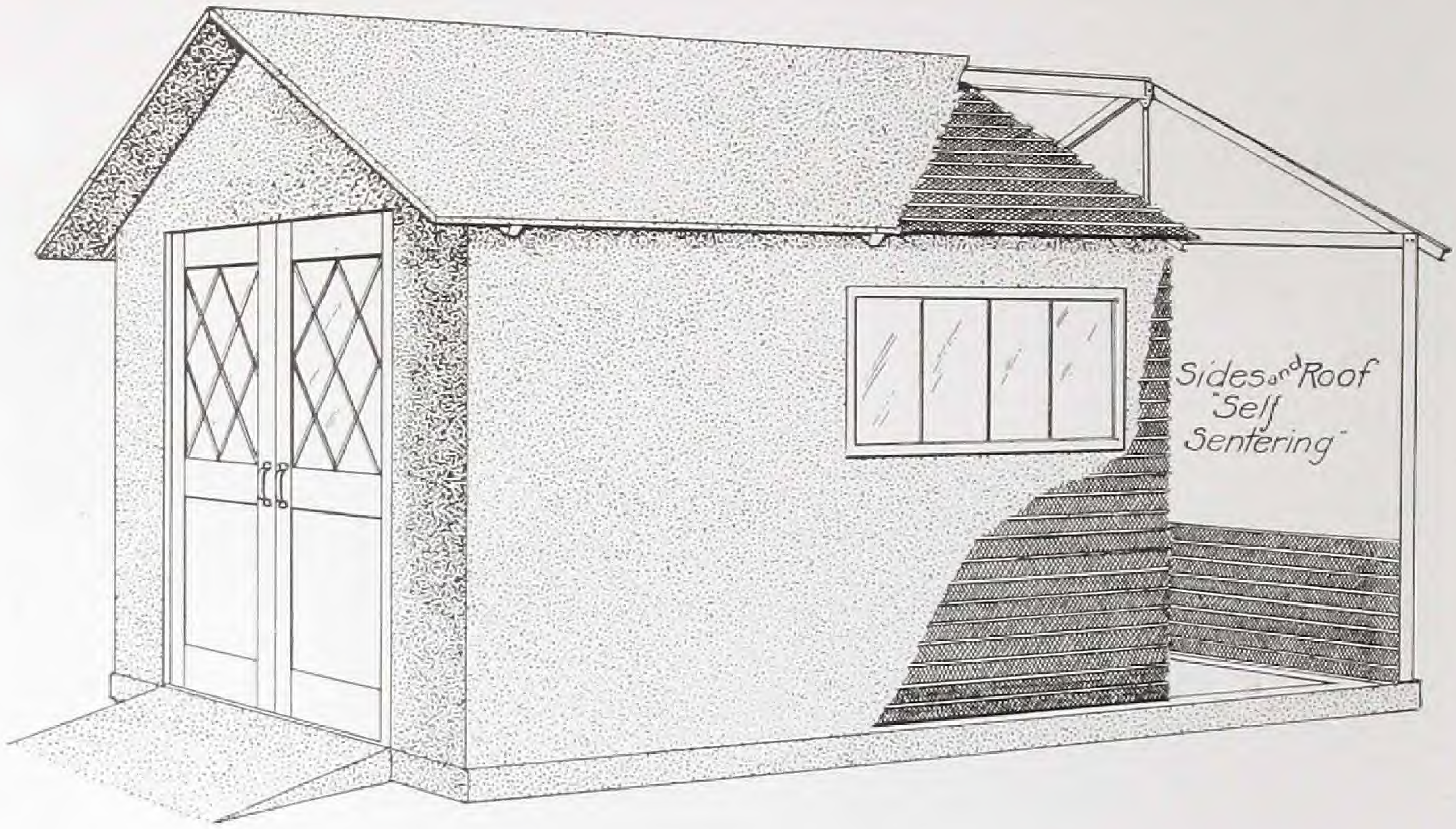
Fireproof House, built at Youngstown, Ohio
Architect, Louis Boucherle, Youngstown, Ohio

The two residences shown in the lower picture were built by Mr. Philip B. Hoge, C. E., of Washington, D. C. They are located at Highland Park, Va.

They are built with reinforced concrete columns, beams and floor slabs, with hollow curtain walls of cement plaster on Self-Sentering. The roof is a 2-inch concrete slab reinforced with Self-Sentering. Interior partitions are 2-inch solid cement plaster on Self-Sentering.

It will never require repairs, will be warm in winter and cool in summer and will take a minimum insurance rate.

Self-Sentering Garages

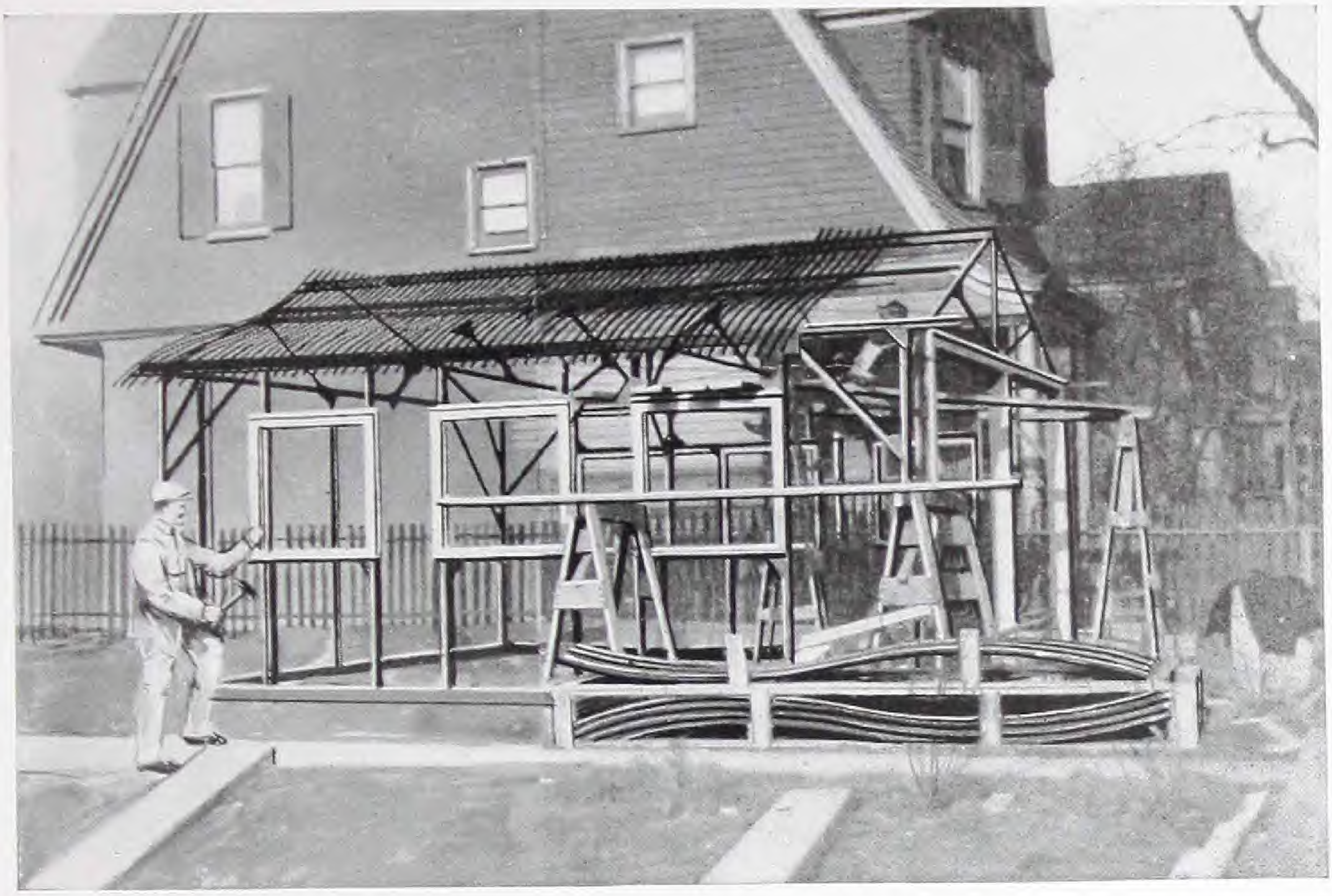


The need for fireproof garages is unquestioned and yet many have done without them, either because of the high cost of the concrete garage or because of the ungainly appearance of the various "tin" or light sheet metal structures offered.

The Self-Sentering garage offers a solution to this difficulty in that it gives the durability and fire-resisting features desired at moderate cost and at the same time permits of a building which is an ornament rather than a detriment to any surroundings. It harmonizes equally well with all classes of residences and presents an appearance of stability and richness which makes it adaptable to any location.

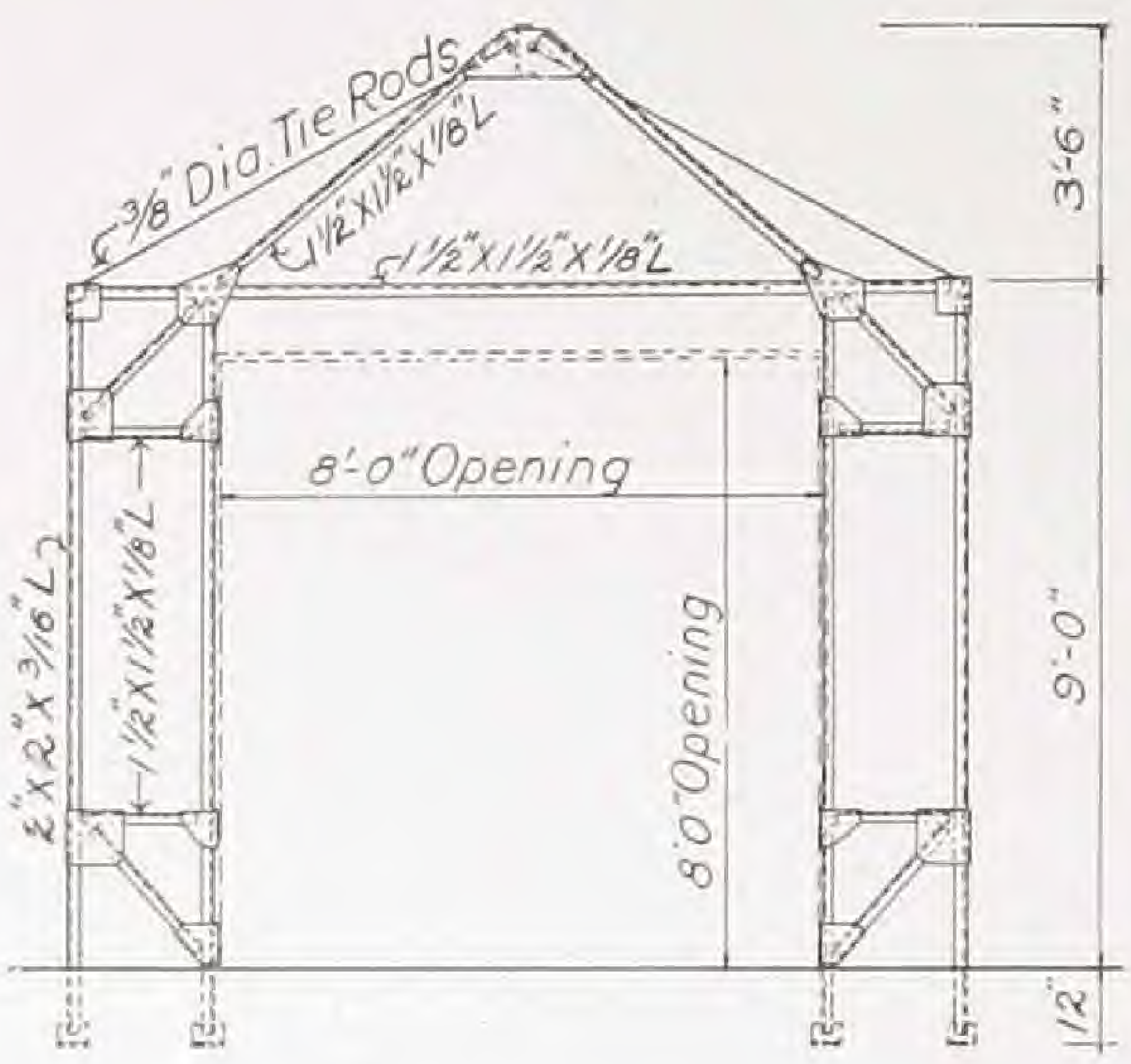
It is constructed on a light framework of steel angles or channels with Self-Sentering attached for both roof and walls and cement plaster applied to a thickness of 2 or 2½ inches.

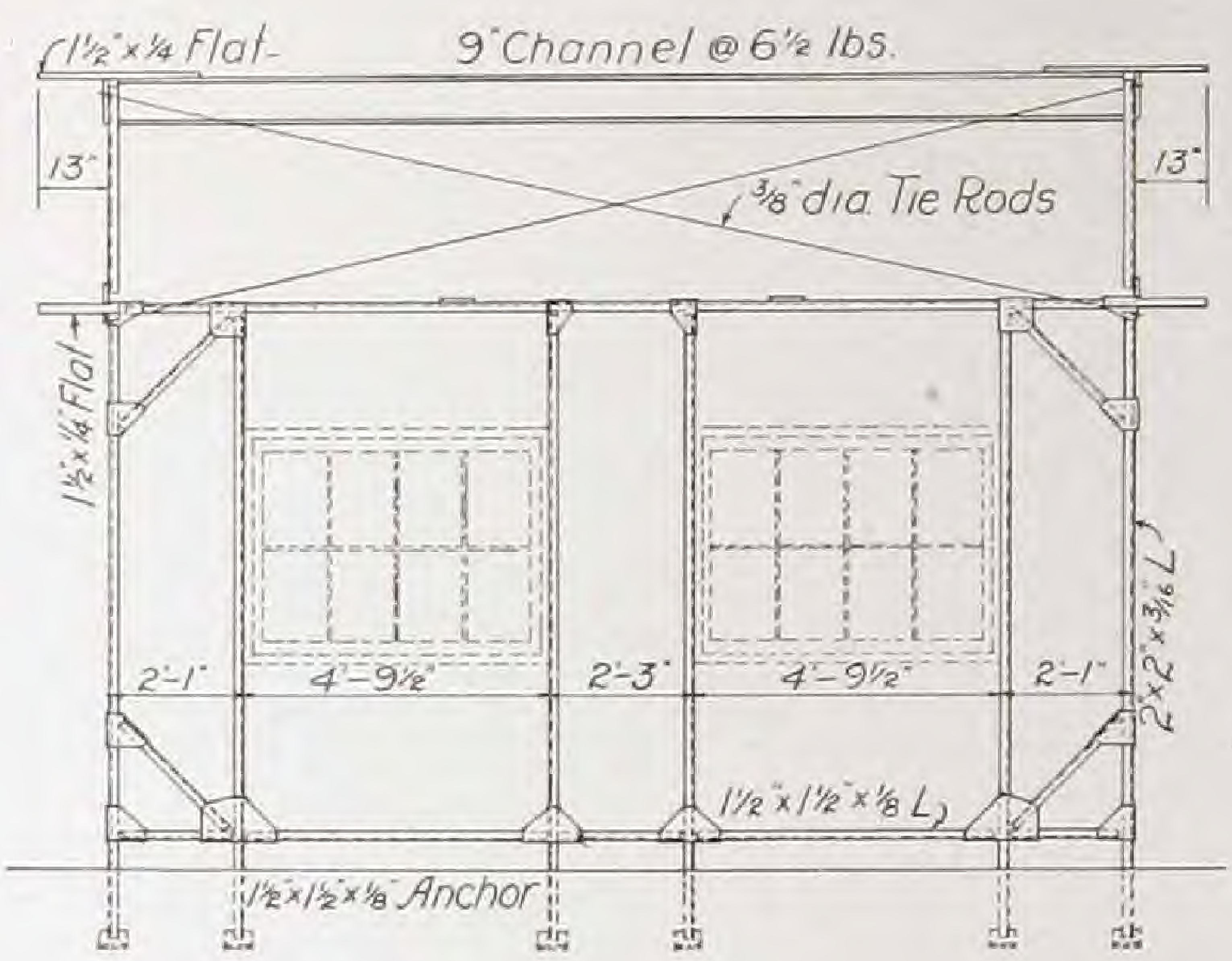
The plans here shown are only typical and the versatility of this type of construction will make possible many pleasing variations at practically no increase in cost over the plainer types.

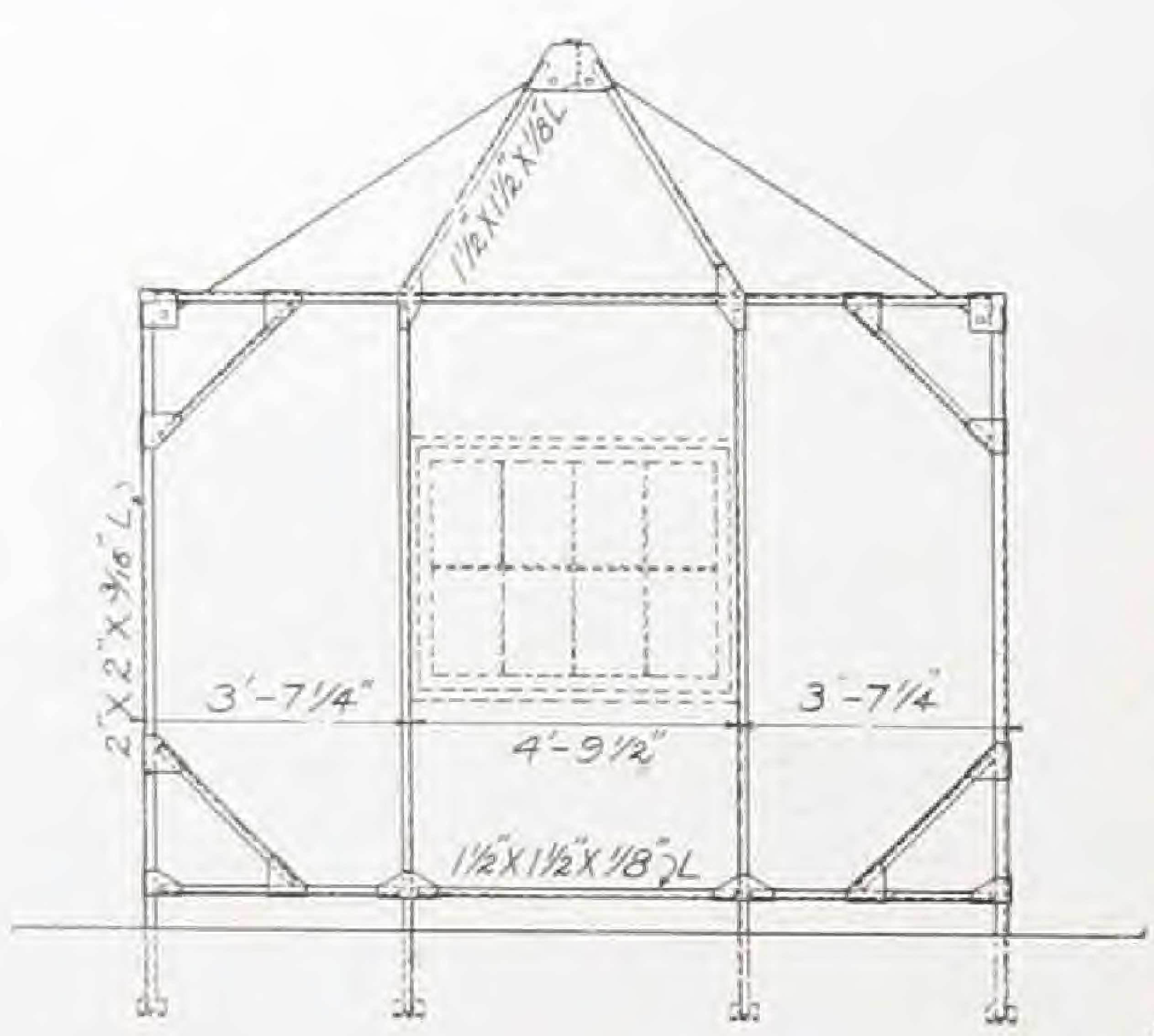


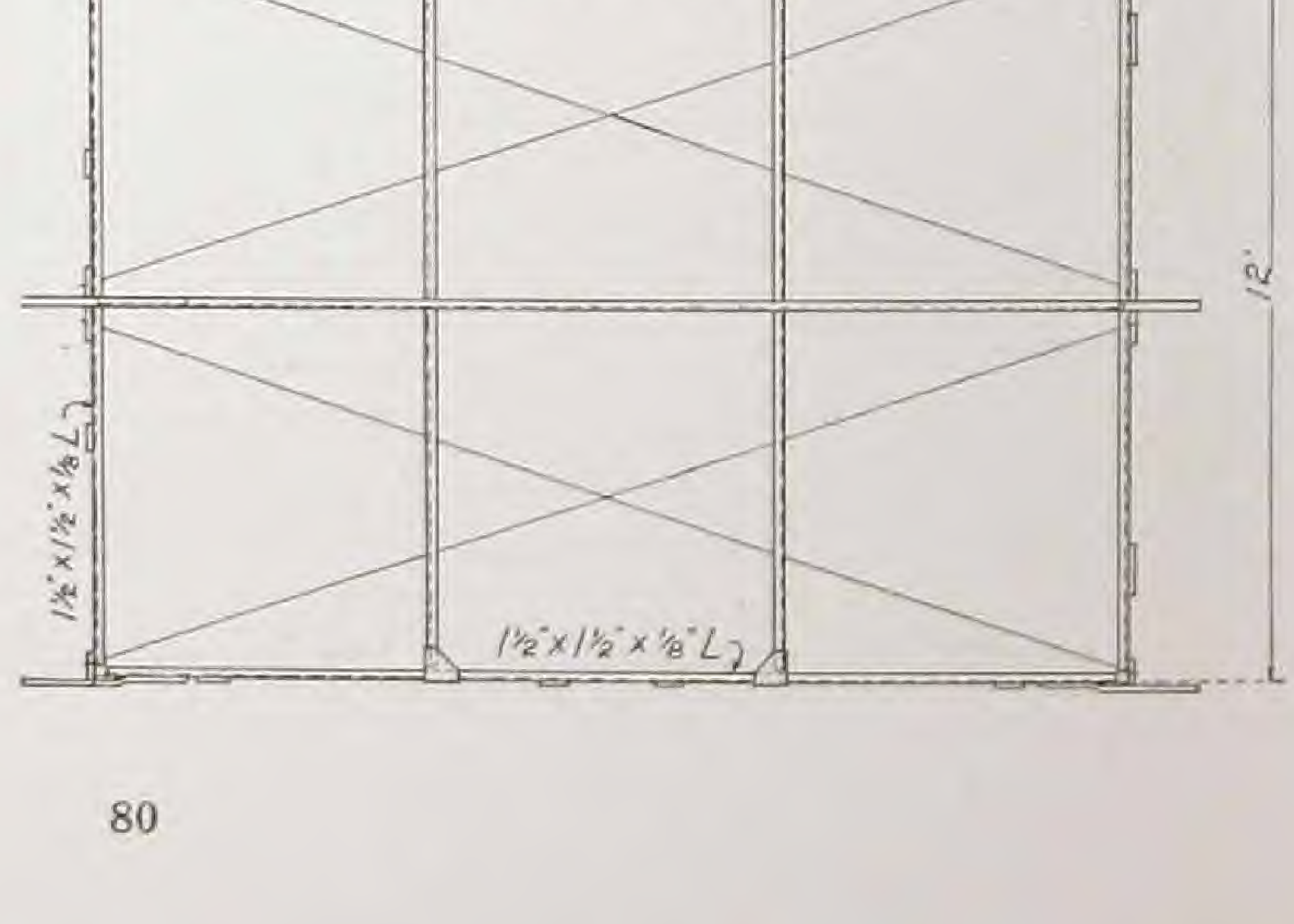
Self-Sentering Garage at 388 Broadway, Long Island City, L. I.

Self-Sentering Garage Details







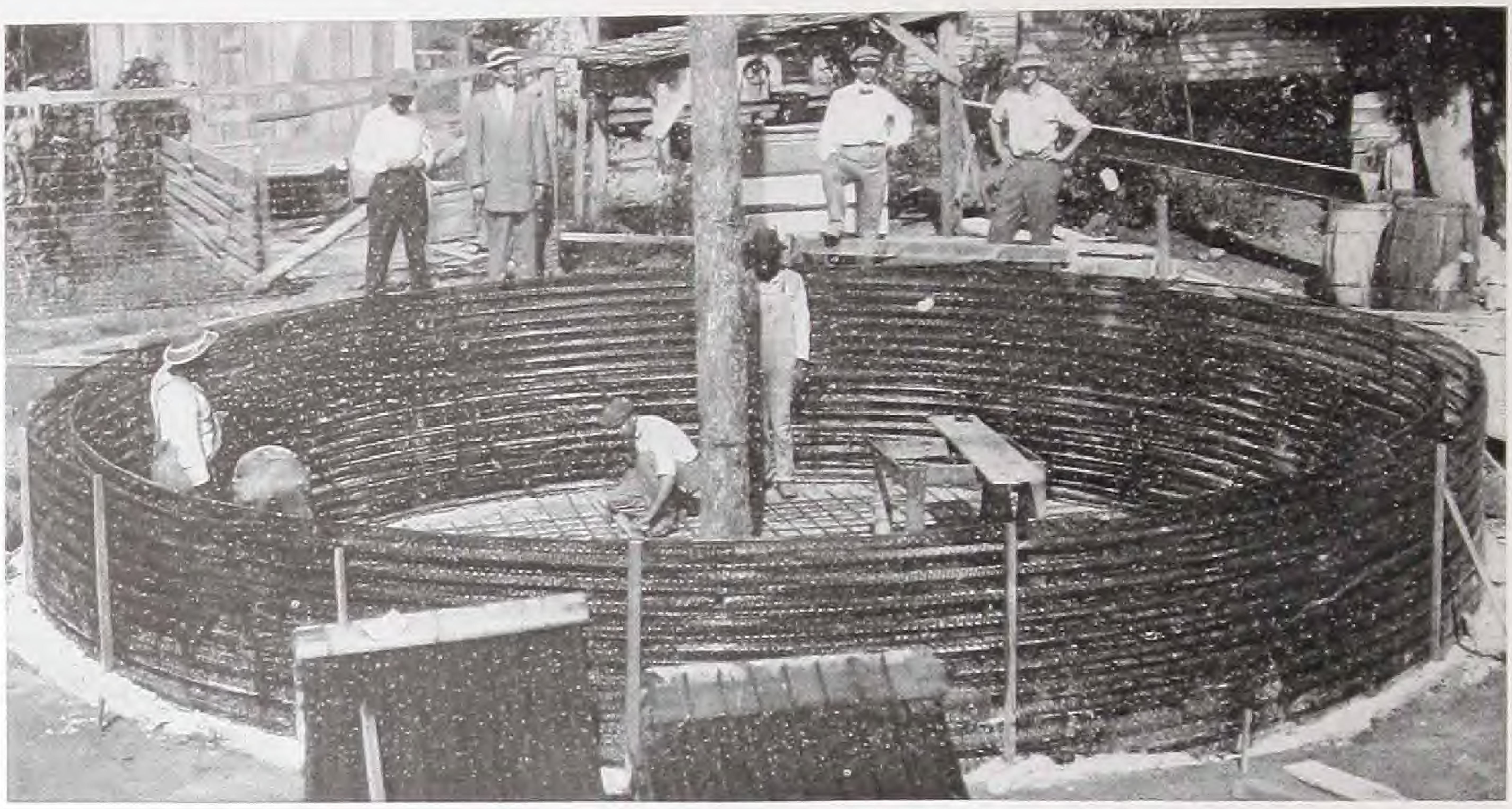


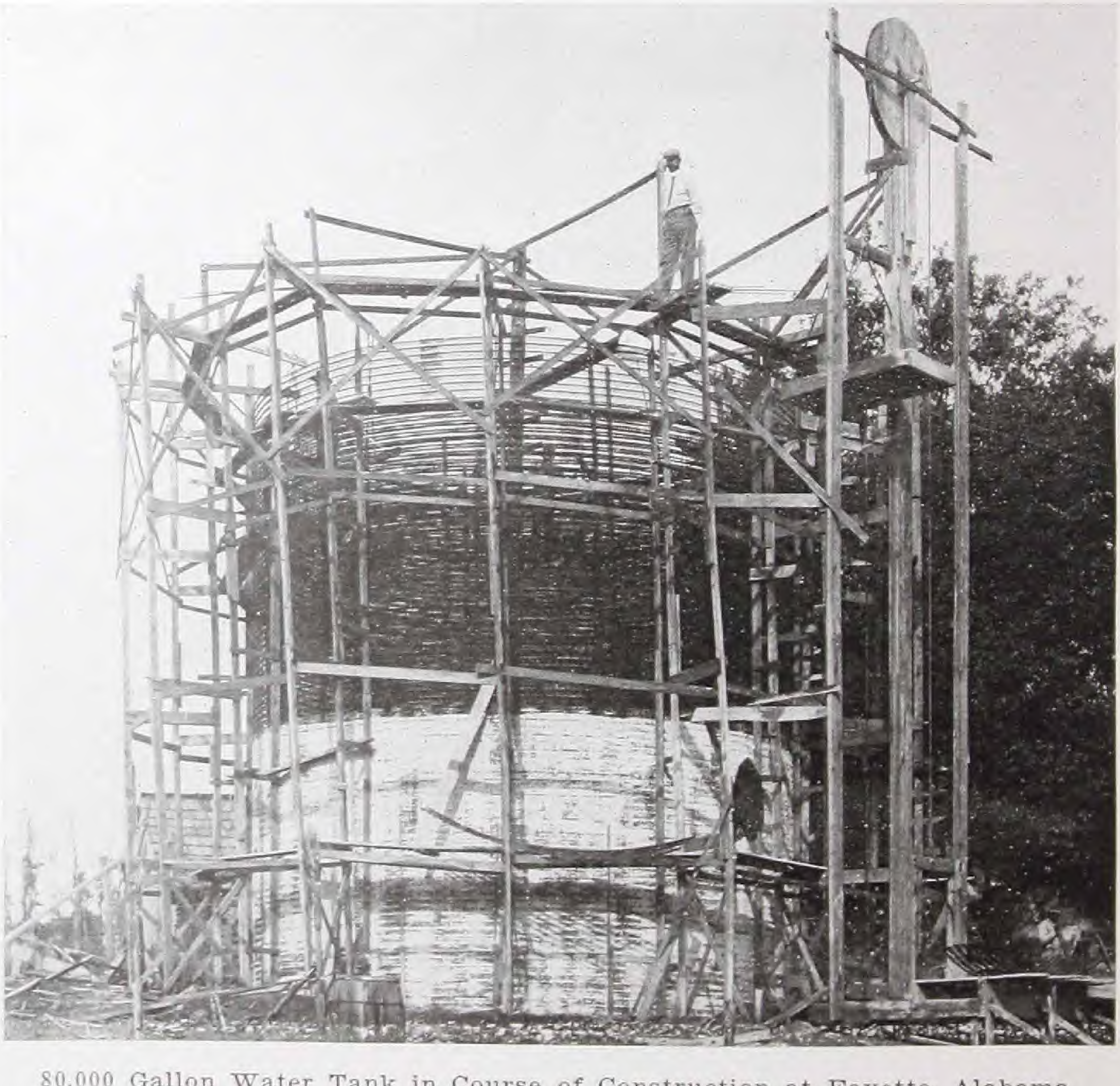
Self-Sentering Tanks

For water tanks of almost any size, Self-Sentering provides a means of reducing the cost and simplifying the construction.

For large tanks similar to those shown here, a double wall of Self-Sentering, curved at our factory to the desired radius, is used. The sheets are set on edge with side ribs interlocking and secured by punching, and end laps similarly fastened. The sheets can be so exactly curved that when two completed walls are in place the space between will be of uniform thickness without the necessity of spacers. The tank is then plastered inside and out with cement mortar and when this has attained its initial set, concrete is poured into the space between the two walls, making a solid wall. It has been found that Self-Sentering so used is cheaper than the wood forms which would otherwise be required, even if its reinforcing value is not considered.

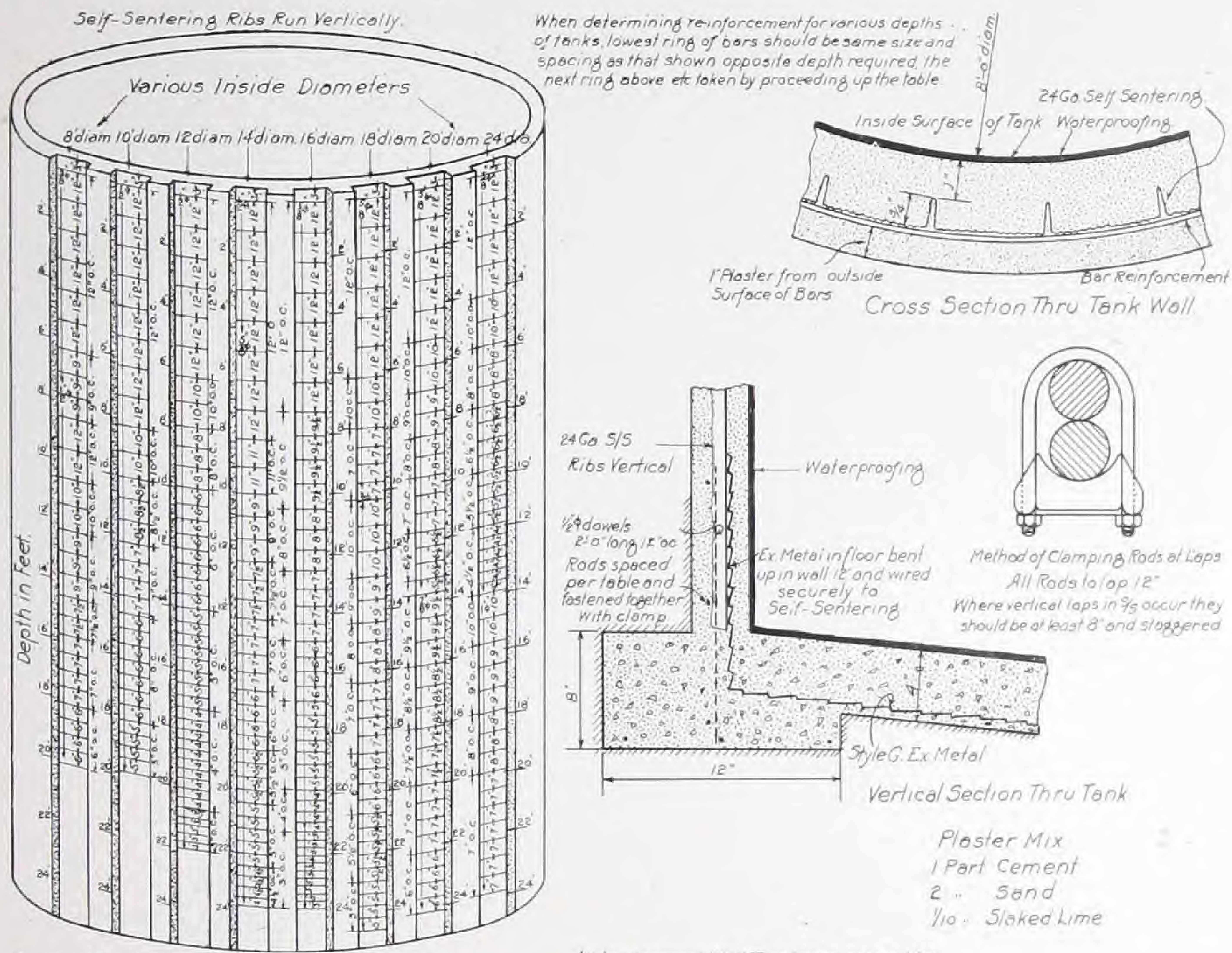
For small tanks, the single wall may be used, merely plastering the Self-Sentering on both sides with cement plaster and using some suitable waterproofing.





80,000 Gallon Water Tank in Course of Construction at Fayette, Alabama. Self-Sentering Used for Walls. Engineer, E. B. Kay, Tuscaloosa, Ala. Builder, W. W. Moore, Birmingham

Self-Sentering Tanks—*Continued*



Cover all Steel with at least One Inch of Plaster In Deep and Wide Tanks at least 1½"

Note—Increase Wall Thickness according to Diameter and Depth of Tanks.

Another method of building Self-Sentering tanks is here shown. The Self-Sentering is run vertically and round rods are placed at correct intervals, as shown in the sketch, to take care of bursting pressure.

This gives a solid-wall tank of almost any desired capacity—only one layer of Self-Sentering is used and this plastered on both sides to the required thickness. No forms are required.

The variation in size of tanks and corresponding differences in stresses are cared for by varying the spacing of the rods encircling the tank.

Self-Sentering Silos

In the construction of farm buildings, the tendency to build for permanence and for fire protection is increasing rapidly and the concrete building is coming to be recognized by the progressive farmer as the most desirable from every standpoint.

One of the most important of his buildings, if he be a stock raiser particularly, is the silo and though the expense of curved form work has always been more or less of a bugbear when considering a concrete silo, by the use of Self-Sentering this objection is removed. A framework either of 2 x 4 studs or of steel channels or steel studding spaced about 30 inches on centers is erected and Self-Sentering, curved in our factory to the exact radius required, is erected both inside and out, and then plastered on both sides with cement mortar of the same consistency as described in specifications for outside walls on page 64. This type is sometimes made by erecting the inner wall first with the studs outside, plastering this inner wall both inside and out and then erecting the outside wall and plastering on the outside only. While slightly more expensive than the other, this makes the highest type of fireproof silo.

A solid wall Self-Sentering silo may also be made by setting curved sheets on edge, guided by ¼-inch bars run vertically 30 inches on centers, with side ribs securely interlocked and punched and wired and end laps secured at every rib in the same manner. Cement plaster is then applied to outside and inside until the required thickness of the wall is obtained. It is well to use some approved brand of waterproofing with a finish coat on both sides.

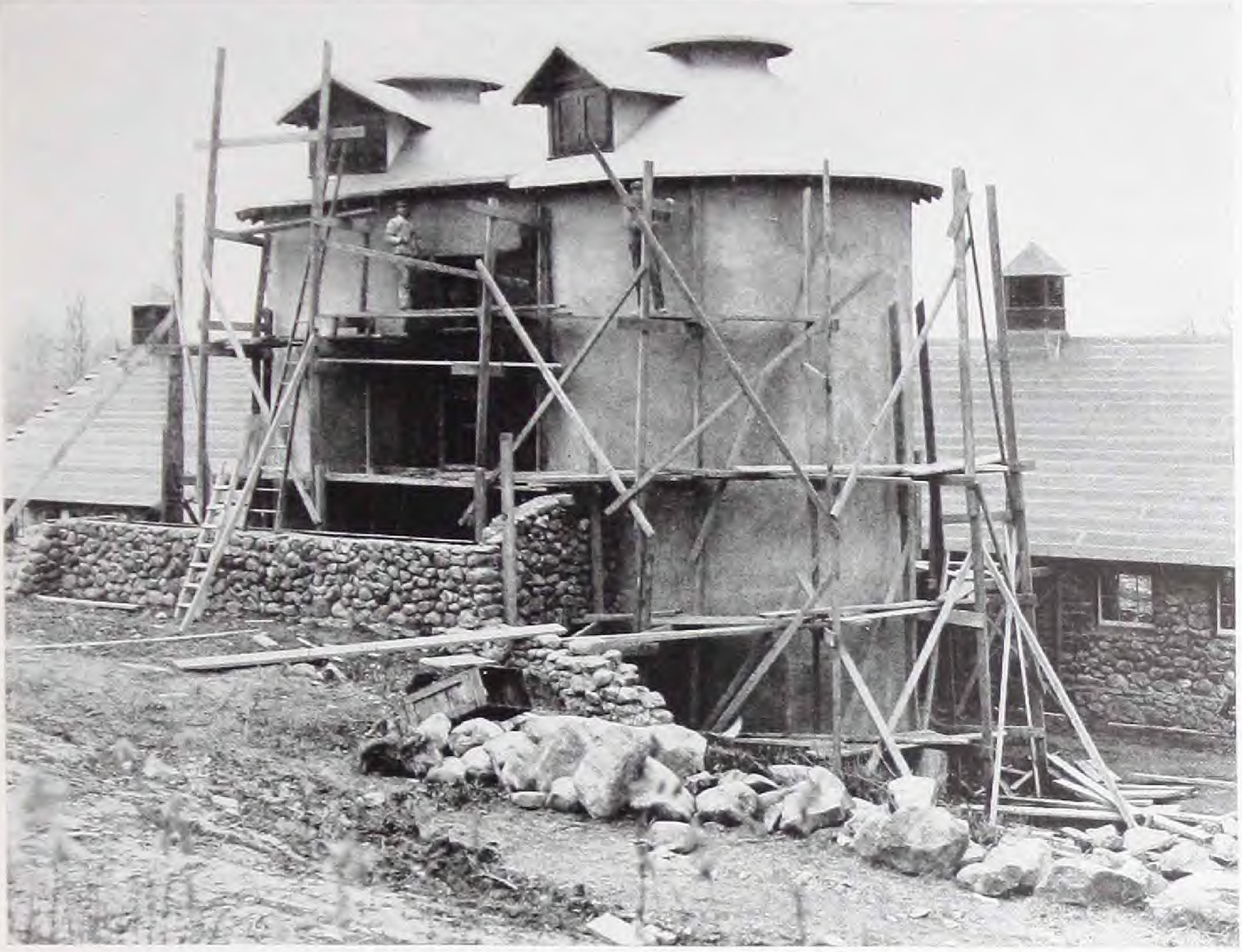
Such silos as here shown cost but little more than the old wood buildings but they cannot be burned up or blown down, never require repairs and are practically everlasting.

To those contemplating the erection of silos, the following table, published through the courtesy of the American Association of Portland Cement Manufacturers, will be of value in determining the correct size:

Dimensions of Silo According to Size of Herd

NO. OF COWS IN HERD	FEED FOR 180 DAYS				FEED FOR 240 DAYS			
	Estimated Tonnage of Silage Consumed	Size of Silo		Corn Acreage Required at 15 Tons to Acre	Estimated Tonnage of Silage Consumed	Size of Silo		Corn Acreage Required at 15 Tons to Acre
		Diameter	Height			Diameter	Height	
	Tons	Feet	Feet	Acres	Tons	Feet	Feet	Acres
10	36	10	25	2½	48	10	31	3½
12	43	10	28	3	57	10	35	4
15	54	11	29	4	72	11	36	5
20	72	12	32	5	96	12	39	6½
25	90	13	33	6	120	13	40	8
30	108	14	34	7½	144	15	37	10
35	126	15	34	8½	168	16	38	11
40	144	16	35	10	192	17	39	13
45	162	16	37	11	216	18	39	14½
50	180	17	37	12	240	19	39	16
60	216	18	39	14½	288	20	40	19
70	252	19	40	17	336			

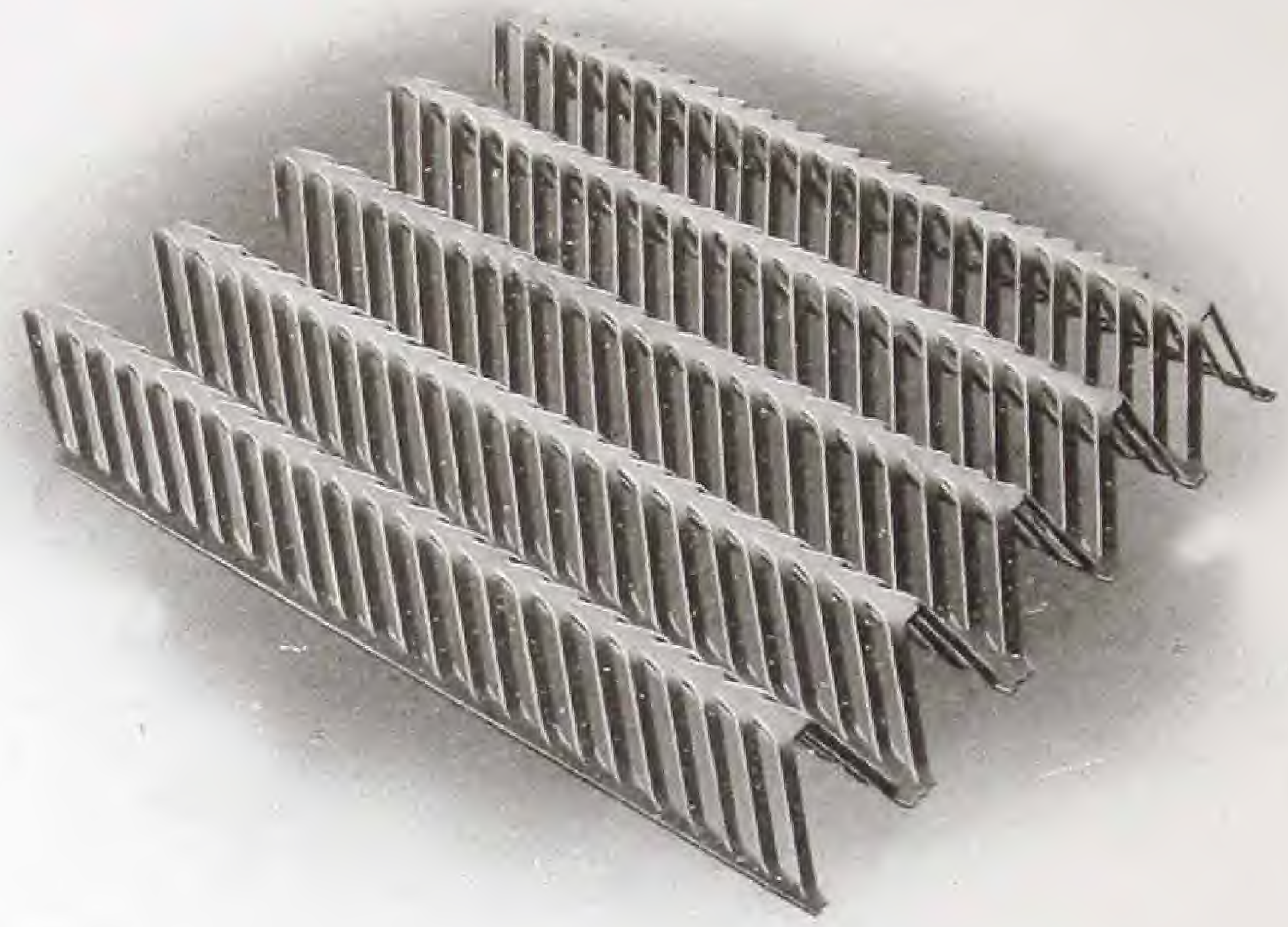
This is based on 40 pounds of silage per day for each cow. Horses and mules take about half that amount and sheep about one-third.



Twin Silos Erected with Double Self-Sentering Walls, Mohegan Farm, Mohegan Lake, N. Y. Charles H. Baker, Proprietor

Self-Sentering Silo in Course of Erection on Dickson Farm, Hubbard, Ohio

"Trussit"



Patented

"Trussit" is a corrugated expanded steel sheet, for fireproofing walls and partitions. The chief advantages of Trussit as a reinforcement of this kind are that it eliminates entirely the use of permanent studding and permits of the erection of partitions but 2 inches in thickness, space saving and wonderfully rigid; curtain walls the equal of brick or poured concrete at practically half their cost. This material is uniformly expanded in both directions, giving equal strength from either side. It is so interwoven back and forth through the cement or plaster that it is not a mere backing for the wall but is an integral part of it. This uniform distribution of the metal also overcomes any tendency toward expansion or contraction in any one general direction, due to changes of temperature.

Standard size sheets are 19 x 96 inches, but Trussit is also carried in stock in lengths from 4 to 12 feet by steps of 6 inches, also 8-feet 4-inch lengths in 24 gauge only. Intermediate lengths supplied from stock will be cut from the next longer sheet and waste charged to customer. Also furnished in sheets 15½ inches wide.

Always packed 10 sheets to the bundle.

GAUGE	WEIGHT PER SQUARE FOOT	
	Plain or Painted	Galvanized
27	.58 lbs.	.70 lbs.
26	.63 lbs.	(Not made)
24	.83 lbs.	.96 lbs.

Trussit cut from galvanized sheets can be supplied from stock in 8-foot lengths only. Orders for other lengths will be subject to delays incidental to delivery of sheets from the mill.

Trussit can also be furnished cut from American Ingot Iron in 8-foot lengths from stock and in other lengths from mill shipment of sheets.

Expanded Metal

Weight for weight, Expanded Metal has greater reinforcing value than any other material. It has been found to be efficient in reinforced concrete structures of so many and such varying types that but brief mention need be made of the advantages that have been demonstrated in its long-continued and successful use.

Diagonal strands, forming diamond-shaped meshes, provide the best possible stress distribution. All the steel is of value as reinforcement, and none of it is used merely to space the load carrying members. Any tendency on the part of the mesh to elongate under stress and to close up on the sides subjects the concrete to compression, and is effectually resisted.

The fact that Expanded Metal is made in sheets of convenient size reduces to a minimum the cost of placing the steel, particularly in work where it is difficult to handle reinforcement in large units. The sheets interlock when lapped, so that there is effectual continuity of the reinforcement. In long span work, by lapping sheets, additional reinforcement may be provided at the center of the slab, where the bending moment is greatest.

Style	Size Mesh Short Way of Diamond	Nominal Gauge of Metal	Delivery	Approx. Wt. per Sq. Foot	Net Sec. Area per Foot of Width in Sq. Inches	STANDARD SIZE SHEETS	
						Lengths	Widths
						Long Way of Diamond	Short Way of Diamond
G	3″	10	Stock Shipment	.6	.176	6′,8′,9′,10′8″	3′,4′,5′,6′
H	3″	10		.9	.265	6′,8′,9′,10′8″	4′,5′4″
J	3″	10		1.2	.353	6′,8′,9′,10′8″	3′,4′,6′
F	3″	12		.51	.150	6′,8′,9′,10′8″	3′,4′,6′
R	1½″	12		.66	.194	6′,8′	3′,4′,6′
S	¾″	13		.84	.246	6′,8′	3′,4′,6′
A	3″	7	Mill Shipment only	1.36	.4	8′,10′8″	5′
B	3″	7		2.0	.609	8′,10′8″	5′
K	3″	16	Usually Five Days to Two Weeks from Receipt of Order	.278	.082	6′,8′,10′8″	3′,4′,5′,6′
P	3″	16		.2	.059	6′,8′,10′8″	3′,4′,6′
M	2¼″	12		.56	.164	6′,8′,10′6″	4′,5′
L	2¼″	16		.4	.118	6′,8′,10′6″	3 ,4′,6′
C	2″	12		.547	.161	6′,8′	4′,5′
D	2″	16		.351	.103	6′,8′	4′,5′
E	1½″	16		.360	.105	6′,8′	4′,5′
O	1½″	18		.308	.088	6′,8′	3′,6′
V	1″	13		.796	.234	6′,8′	4′8″
W	1″	16		.597	.175	6′,8′	3′,4′,6′
X	1″	18		.425	.125	6′,8′	4′4″
Y	¾″	16		.525	.154	6′,8′	4′4″
Z	¾″	18		.500	.147	6′,8′	3′8″
T	½″	18		.750	.220	6′,8′	4′

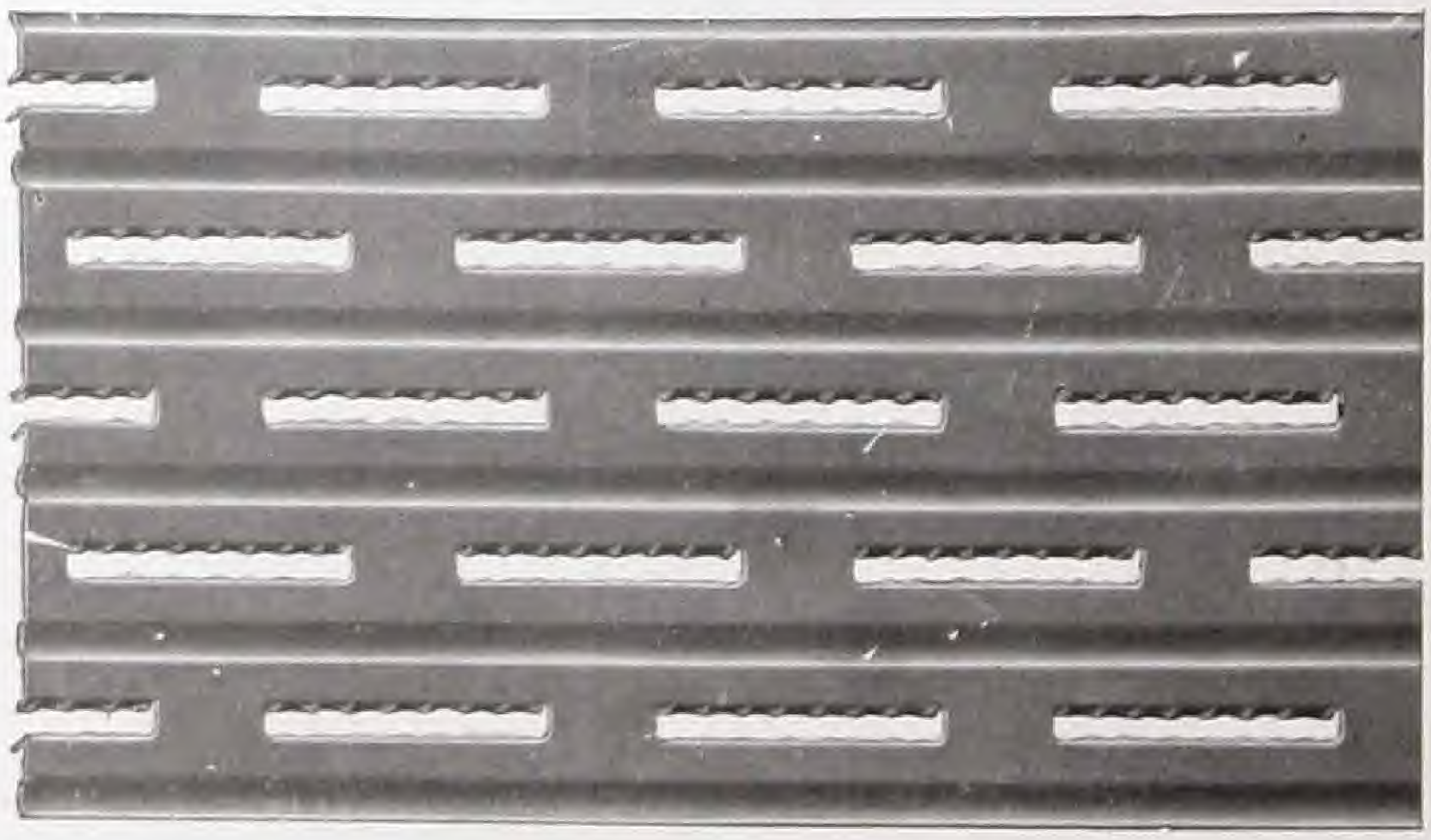
Key Expanded Metal Lath

This type of lath, while widely and successfully used for all classes of work, due to its uniform flexibility, is particularly adapted for all curved surfaces and beam or column wrapping. Its extra wide sheets make this lath very economical to erect and its small mesh affords a perfect bond for the plaster.

Size sheets—24 x 96 inches—1 7-9 square yards.
Packed 15 sheets—26 2-3 yards to the bundle.
Furnished plain, painted or galvanized.
Approximate weights per square yard:

Gauge	Plain or Painted	Galvanized
27	2.30 pounds	2.73 pounds
26	2.50 pounds	2.94 pounds
25	3.05 pounds	3.32 pounds
24	3.40 pounds	3.74 pounds
22	4.00 pounds	Not Made

Genfire Sheet Steel Lath



A metal lath to be used where plaster economy is a feature. Takes even less plaster than wood lath; is fireproof, vermin proof and gives a surface free from cracks and stains.

Sheets, 13½x96 inches—1 square yard.
Sheets, 24x96 inches—1 7-9 square yards.
Packed, 10 sheets to a bundle.
Weight, 4.6 pounds per square yard.
Always furnished painted unless otherwise specified.

Herringbone Expanded Metal Lath

Style "A"

Style "A-28" Herringbone Expanded Metal Lath is recommended particularly for ceilings. This is because it has heavier ribs and smaller openings than other styles, which enables it to successfully carry the heavy load of plaster required for ceilings.

Ceilings plastered on Style "A-28" Herringbone are fireproof, durable and eliminate all danger of falling plaster. The extreme rigidity of this style permits of its erection on joists or ceiling bars 16 inches on centers without any possibility of its sagging between. This insures a uniform thickness of plaster throughout which means a satisfactory finished job and freedom from unsightly surface cracks.

Metal lath should be specified not only by gauge but by weight per square yard as well. Style "A-28" Herringbone weighs 3 pounds per square yard, being heavier than some other makes in thicker gauges. We recommend the use of coated lath—either painted or galvanized.

Packed 20 sheets—20 square yards to the bundle.
Size sheets—13½x96 inches—1 square yard.
Size mesh—$\frac{3}{16}$x1 inch.
Weight per square yard:

28 gauge	3 pounds
28 gauge, Galvanized	3.75 pounds

Herringbone Expanded Metal Lath

Style "BB"

This lath is the accepted standard wherever metal lath is used. Its rigidity, giving firm plastering surface and allowing wide spacing of studding; its wide sheets; its flat strands, which spread rather than cut the plaster; its perfect key—all combine to make a lath that is most desirable to the owner, architect or contractor.

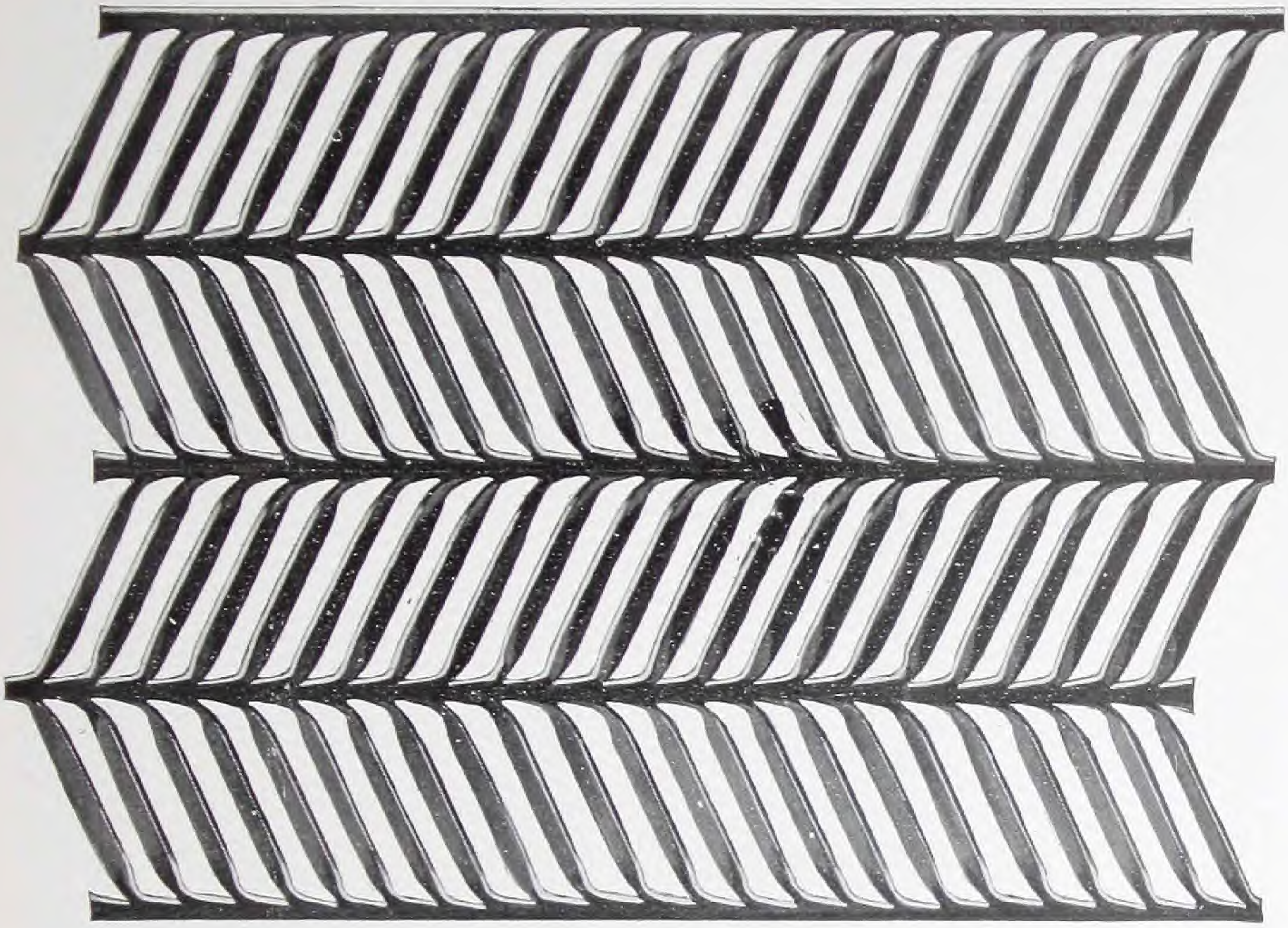
Packed 15 sheets—22½ square yards to the bundle.
Size sheets—20¼ x 96 inches—1½ square yards.
Size mesh—7-32 x 1¼ inches.

Approximate weights per square yard:

27 gauge	2.25 pounds
26 gauge	2.50 pounds
24 gauge	3.38 pounds
22 gauge	4.21 pounds
27 gauge, Galvanized	3.00 pounds
24 gauge, Galvanized	3.91 pounds

Furnished plain, painted or galvanized, except 26 and 22 gauges, which are not furnished galvanized.

Herringbone Expanded Metal Lath



Style "AAA"

The strength of metal lath is dependent upon two factors—its design and weight. Both are combined in a high degree in the manufacture of this style. It is the "general purpose" Herringbone—its use insuring excellent results whether used for partitions, ceilings or cement siding. From the illustration it is seen that every rib is a heavy rib. This means increased rigidity. The table below gives the approximate weights per square yard and the stud spacing which may be used without fear of sagging lath.

Packed 15 sheets—20 square yards to the bundle.
Size sheets—18 x 96 inches—1 1-3 square yards.
Size mesh—7-32 x 1¼ inches.

	Weight per Sq. Yd.		Studding, Center to Center	
Gauge	Plain or Painted	Galvanized	Walls	Ceilings
27	2.53	3.17	16 to 18″	16″
26	2.81	Not made	20″	18″
24	3.79	4.39	22 to 24″	20″-22″-24″
22	4.74	Not made	26 to 28″	26 to 28″

Herringbone Ingot Iron Lath

Woolworth Building, New York City
Architect, Cass Gilbert
Herringbone Ingot Iron Lath used for Ceilings

New Municipal Building,
Architects, McKim, Meade & White
Herringbone Ingot Iron Lath Specified and Used

After years of scientific research, eminent metallurgists agree that the corrosion of iron and steel is in direct proportion to the amount of impurities contained.

In order to furnish a lath to prevent the possibility of corrosion from adverse climatic conditions, the action of patent plasters, electrolysis, etc., Herringbone Lath is made from American Ingot Iron. This iron is beyond a doubt the purest commercially manufactured. It analyzes 99.84% pure and when desired a bond will be furnished guaranteeing this purity.

For the purchaser's protection this lath is always coated with a special paint and each bundle is patent sealed and distinctively tagged.

Gauges, Weights per Square Yard, Sizes, Packing, etc., as follows:

Style	Gauge	Size of Sheets	Square Yards per Sheet	Sheets per Bdl.	Weights per Square Yard
"A"	27	13½ x 96″	1	20	3.33
"AAA"	27	18 x 96″	1⅓	15	2.53
"AAA"	26	18 x 96″	1⅓	15	2.81
"AAA"	24	18 x 96″	1⅓	15	3.79
*"AAA"	22	18 x 96″	1⅓	15	4.74
"BB"	27	20¼ x 96″	1½	15	2.25
"BB"	26	20¼ x 96″	1½	15	2.50
"BB"	24	20¼ x 96″	1½	15	3.38
*"BB"	22	20¼ x 96″	1½	15	4.21

*All of above furnished from stock except "AAA"-22 Gauge and "BB"-22 Gauge which are supplied on mill shipment of sheets only.

Table No. 13

Volume of Plastic Mortar Made from Different Proportions of Cement and Sand
Quantities of Materials Per Cubic Yard

Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 230

Relative proportions by volume*		Volume of Compacted Plastic Mortar						Materials for 1 cu. yd. Compact Plastic Mortar Based on barrel of					
		From 1 cu.ft. Cemt. Based on Port. Cemt. weighing			From 1 bbl. Cement Based on barrel of			3.5 cu. ft.		**3.8 cu.ft.**†		4 cu. ft.	
Cement	Sand	108 Lbs. per Cu. Ft.	**100 Lbs. per Cu. Ft.**†	95 Lbs. per Cu. Ft.	3.5 Cu. Ft.	**3.8 Cu. Ft.**†	4 Cu. Ft.	Packed Cement	Loose Sand	**Packed Cement**	**Loose Sand**	Packed Cement	Loose Sand
		cu. ft.	**cu. ft.**	cu. ft.	cu. ft.	**cu. ft.**	cu. ft.	bbl.	cu. yd.	**bbl.**	**cu. yd.**	bbl.	cu. yd.
1	0	0.93	0.86	0.80	3.2	3.2	3.2	8.31		8.31		8.31	
1	½	1.12	1.06	1.02	3.9	4.0	4.1	6.92	0.46	6.73	0.47	6.61	0.49
1	1	1.48	1.42	1.38	5.2	5.4	5.5	5.22	0.68	5.01	0.71	4.88	0.72
1	1½	1.84	1.78	1.74	6.4	6.7	7.0	4.20	0.81	4.00	0.84	3.87	0.86
1	2	2.20	2.14	2.11	7.7	8.1	8.4	3.51	0.91	3.32	0.93	3.21	0.95
1	2½	2.56	2.50	2.47	9.0	9.5	9.9	3.01	0.98	2.84	1.00	2.74	1.01
1	3	2.92	2.86	2.83	10.2	10.9	11.3	2.64	1.03	2.48	1.05	2.39	1.06
1	3½	3.28	3.23	3.19	11.5	12.2	12.8	2.35	1.06	2.20	1.08	2.12	1.10
1	4	3.64	3.59	3.55	12.8	13.6	14.2	2.12	1.10	1.98	1.11	1.90	1.13

NOTE—Variations in the fineness of the sand and the cement, and in consistency of the mortar may affect the values by 10% in either direction.

*Cement as packed by manufacturer, sand loose. †**Use these columns ordinarily.**

One cubic yard cement plaster covers:

⅝" thick 63 sq. yds. ⅞" thick—45 sq. yds. 1¼" thick—31½ sq. yds. 1¾" thick—22½ sq. yds.
¾" thick—54 sq. yds. 1" thick—36 sq. yds. 1½" thick—27 sq. yds. 2" thick—18 sq. yds.

10% lime added will increase these quantities not more than 5%.

Table No. 14

Cubic Yards Concrete Required for Beams, Columns and Slabs

CUBIC YARDS OF CONCRETE FOR BEAMS 100 FT. LONG										COLUMNS					SLABS		
											SQUARE		ROUND				
DEPTH / Width	4 Inch	5 Inch	6 Inch	7 Inch	8 Inch	9 Inch	10 Inch	11 Inch	12 Inch	Side of Square or Diam. of Round	Cubic Yds. per Ft. Height	Weight per Ft. Height and Area Section	Cubic Yds. per Ft. Height	Weight per Ft. Height and Area Section	Thickness	Cubic Yds. Per 100 Sq. Ft.	Weight Per Sq. Ft.
4"	.412																
5"	.515	.643															
6"	.617	.772	.926							6"	.009	36					
7"	.720	.900	1.080	1.260						7"	.013	49			2"	.6175	24
8"	.823	1.029	1.235	1.440	1.646					8"	.016	64			2½"	.7715	30
9"	.926	1.157	1.389	1.620	1.852	2.083				9"	.021	81			3"	.926	36
10"	1.029	1.286	1.543	1.801	2.058	2.315	2.572			10"	.026	100					
11"	1.132	1.415	1.697	1.981	2.263	2.546	2.829	3.112		11"	.031	121			3½"	1.080	42
12"	1.235	1.543	1.852	2.161	2.469	2.778	3.086	3.395	3.704	12"	.037	144	.029	113.1			
13"	1.337	1.672	2.006	2.340	2.675	3.009	3.343	3.677	4.012	13"	.043	169	.034	132.7	4"	1.235	48
14"	1.440	1.801	2.161	2.521	2.881	3.241	3.601	3.961	4.321	14"	.050	196	.040	153.9			
15"	1.543	1.929	2.315	2.701	3.086	3.472	3.858	4.244	4.630	15"	.058	225	.045	176.7	4½"	1.389	54
16"	1.646	2.058	2.468	2.881	3.292	3.704	4.115	4.526	4.936	16"	.066	256	.052	201.1			
17"	1.749	2.186	2.624	3.061	3.498	3.935	4.373	4.810	5.247	17"	.074	289	.058	227.0	5"	1.543	60
18"	1.852	2.315	2.778	3.241	3.704	4.167	4.630	5.093	5.555	18"	.083	324	.065	254.5			
19"	1.955	2.443	2.932	3.421	3.909	4.398	4.887	5.376	5.864	19"	.093	361	.073	283.5	5½"	1.698	66
20"	2.058	2.572	3.086	3.601	4.115	4.630	5.144	5.658	6.173	20"	.103	400	.081	314.2			
21"	2.161	2.701	3.240	3.781	4.321	4.861	5.402	5.941	6.482	21"	.113	441	.089	346.4	6"	1.852	72
22"	2.263	2.829	3.394	3.961	4.526	5.093	5.659	6.224	6.790	22"	.124	484	.098	380.1			
23"	2.366	2.958	3.549	4.141	4.732	5.324	5.916	6.507	7.099	23"	.136	529	.107	415.5	6½"	2.006	78
24"	2.469	3.086	3.704	4.321	4.938	5.555	6.173	6.790	7.408	24"	.148	576	.116	452.4			
25"	2.572	3.215	3.858	4.501	5.143	5.786	6.429	7.072	7.716	25"	.160	625	.126	490.9	7"	2.161	84
26"	2.674	3.343	4.012	4.680	5.349	6.018	6.686	7.358	8.023	26"	.174	676	.136	530.9			
27"	2.778	3.472	4.167	4.861	5.556	6.249	6.944	7.638	8.333	27"	.187	729	.147	572.6	7½"	2.315	90
28"	2.881	3.601	4.321	5.041	5.761	6.481	7.202	7.922	8.642	28"	.201	784	.158	615.8	8"	2.469	96
29"	2.984	3.729	4.475	5.221	5.967	6.713	7.459	8.205	8.951	29"	.216	841	.170	660.5	8½"	2.624	102
30"	3.086	3.858	4.630	5.401	6.173	6.944	7.716	8.488	9.259	30"	.231	900	.182	706.9	9"	2.778	108
31"	3.189	3.987	4.784	5.581	6.379	7.176	7.974	8.770	9.568	31"	.247	961	.194	754.8	9½"	2.932	114
32"	3.292	4.115	4.938	5.761	6.584	7.407	8.230	9.053	9.876	32"	.263	1024	.207	804.2	10"	3.086	120
33"	3.395	4.244	5.091	5.941	6.790	7.639	8.487	9.336	10.18	33"	.280	1089	.220	855.3	10½"	3.241	126
34"	3.498	4.372	5.248	6.122	6.996	7.870	8.745	9.619	10.49	34"	.292	1156	.233	907.9	11"	3.396	132
35'	3.601	4.501	5.401	6.301	7.201	8.101	9.002	9.902	10.80	35"	.315	1225	.247	962.1	11½"	3.550	138
36"	3.704	4.630	5.555	6.481	7.407	8.333	9.259	10.19	11.11	36"	.333	1296	.262	1017.9	12"	3.704	144

Table No. 16

Quantities of Materials for One Cubic Yard of Rammed Concrete Based on a Barrel of 3.8 Cubic Feet

(Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 231)

Proportions by Parts			Proportions by Volumes			Volume of Mortar in Terms of Percentage of Volume of Stone	Percentages of Voids in Broken Stone or Gravel														
							50%*			45%†			40%‡			30%§			20%§		
Cement	Sand	Stone	Packed Cement	Loose Sand	Loose Stone		Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone
			bbl.	cu. ft.	cu. ft.		bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.
1	...	1	1	...	3.8	94	5.09	...	0.72	4.90	...	0.69	4.73	...	0.67	4.33	...	0.61	4.02	...	0.57
1	...	2	1	...	7.6	51	3.67	...	1.03	3.48	...	0.98	3.30	...	0.93	2.93	...	0.82	2.65	...	0.75
1	...	3	1	...	11.4	36	...	...	...	2.69	...	1.14	2.54	...	1.07	2.22	...	0.94	1.98	...	0.84
1	...	4	1	...	15.2	29	...	...	...	...	...	...	...	...	...	1.78	...	1.00	1.58	...	0.89
1	...	5	1	...	19.0	25	...	...	...	...	...	...	...	...	...	1.49	...	1.05	1.31	...	0.92
1	...	6	1	...	22.8	22	...	...	...	...	...	...	...	...	...	1.28	...	1.08	1.12	...	0.95
1	...	7	1	...	26.6	20	...	...	...	...	...	...	...	...	...	...	...	...	0.98	...	0.97
1	...	8	1	...	30.4	19	...	...	...	...	...	...	...	...	...	...	...	...	0.87	...	0.98
1	...	9	1	...	34.2	18	...	...	...	...	...	...	...	...	...	...	...	...	0.78	...	0.99
1	...	10	1	...	38.0	17	...	...	...	...	...	...	...	...	...	...	...	...	0.71	...	1.00
1	...	11	1	...	41.8	16	...	...	...	...	...	...	...	...	...	...	...	...	0.65	...	1.01
1	...	12	1	...	45.5	15	...	...	...	...	...	...	...	...	...	...	...	...	0.60	...	1.01
1	1	1½	1	3.8	5.7	99	3.19	0.45	0.67	3.08	0.43	0.65	2.97	0.42	0.63	2.78	0.39	0.59	2.62	0.37	0.55
1	1	2	1	3.8	7.6	75	2.85	0.40	0.80	2.73	0.38	0.77	2.62	0.37	0.74	2.43	0.34	0.68	2.26	0.32	0.64
1	1	2½	1	3.8	9.5	61	2.57	0.36	0.90	2.45	0.34	0.86	2.34	0.33	0.82	2.15	0.30	0.76	1.99	0.28	0.70
1	1	3	1	3.8	11.4	51	2.34	0.33	0.99	2.22	0.31	0.94	2.12	0.30	0.90	1.93	0.27	0.82	1.77	0.25	0.75
1	1½	2	1	5.7	7.6	93	2.49	0.53	0.70	2.40	0.51	0.68	2.31	0.49	0.65	2.16	0.46	0.61	2.03	0.43	0.57
1	1½	2½	1	5.7	9.5	76	2.27	0.48	0.80	2.18	0.46	0.77	2.09	0.44	0.74	1.94	0.41	0.68	1.80	0.38	0.63
1	1½	3	1	5.7	11.4	64	2.09	0.44	0.88	2.00	0.42	0.84	1.91	0.40	0.81	1.76	0.37	0.74	1.63	0.34	0.69
1	1½	3½	1	5.7	13.3	55	1.94	0.41	0.96	1.84	0.39	0.91	1.76	0.37	0.87	1.61	0.34	0.79	1.48	0.31	0.73
1	1½	4	1	5.7	15.2	49	1.80	0.38	1.01	1.71	0.36	0.96	1.63	0.34	0.92	1.48	0.31	0.83	1.36	0.29	0.77
1	1½	4½	1	5.7	17.1	44	1.69	0.36	1.07	1.60	0.34	1.01	1.51	0.32	0.96	1.37	0.29	0.87	1.25	0.26	0.79
1	1½	5	1	5.7	19.0	40	1.59	0.34	1.12	1.50	0.32	1.06	1.42	0.30	1.00	1.28	0.27	0.90	1.17	0.25	0.82
1	2	3	1	7.6	11.4	75	1.89	0.53	0.80	1.81	0.51	0.76	1.74	0.49	0.74	1.61	0.45	0.68	1.50	0.42	0.63
1	2	3½	1	7.6	13.3	65	1.76	0.49	0.87	1.68	0.47	0.83	1.61	0.45	0.79	1.48	0.42	0.73	1.38	0.39	0.68
1	2	4	1	7.6	15.2	57	1.65	0.46	0.93	1.57	0.44	0.88	1.50	0.42	0.84	1.38	0.39	0.78	1.27	0.36	0.72
1	2	4½	1	7.6	17.1	51	1.55	0.44	0.98	1.48	0.42	0.94	1.41	0.40	0.89	1.28	0.36	0.81	1.18	0.33	0.75
1	2	5	1	7.6	19.0	47	1.47	0.41	1.03	1.39	0.39	0.98	1.32	0.37	0.93	1.20	0.34	0.84	1.10	0.31	0.77
1	2	5½	1	7.6	20.9	43	1.39	0.39	1.08	1.31	0.37	1.01	1.25	0.35	0.97	1.13	0.32	0.87	1.03	0.29	0.80
1	2	6	1	7.6	22.8	40	1.32	0.37	1.11	1.25	0.35	1.06	1.18	0.33	1.00	1.06	0.30	0.89	0.97	0.27	0.82
1	2½	3	1	9.5	11.4	87	1.72	0.61	0.73	1.66	0.58	0.70	1.60	0.56	0.68	1.49	0.52	0.63	1.40	0.49	0.59
1	2½	3½	1	9.5	13.3	75	1.62	0.57	0.80	1.55	0.55	0.76	1.49	0.52	0.73	1.38	0.49	0.68	1.29	0.45	0.64
1	2½	4	1	9.5	15.2	66	1.52	0.54	0.86	1.46	0.51	0.82	1.40	0.49	0.79	1.29	0.45	0.73	1.19	0.42	0.67
1	2½	4½	1	9.5	17.1	60	1.44	0.51	0.91	1.37	0.48	0.87	1.31	0.46	0.83	1.20	0.42	0.76	1.11	0.39	0.70
1	2½	5	1	9.5	19.0	54	1.37	0.48	0.96	1.30	0.46	0.92	1.24	0.44	0.87	1.13	0.40	0.80	1.04	0.37	0.73
1	2½	5½	1	9.5	20.9	49	1.30	0.46	1.01	1.23	0.43	0.95	1.17	0.41	0.91	1.07	0.38	0.83	0.98	0.34	0.76
1	2½	6	1	9.5	22.8	46	1.24	0.44	1.05	1.17	0.41	0.99	1.11	0.39	0.94	1.01	0.36	0.85	0.92	0.32	0.78
1	2½	6½	1	9.5	24.7	42	1.18	0.42	1.08	1.12	0.39	1.02	1.06	0.37	0.97	0.96	0.34	0.88	0.88	0.31	0.80
1	2½	7	1	9.5	26.6	40	1.13	0.40	1.11	1.07	0.38	1.05	1.01	0.36	0.99	0.91	0.32	0.90	0.83	0.29	0.82
1	3	4	1	11.4	15.2	76	1.42	0.60	0.80	1.36	0.57	0.77	1.30	0.55	0.73	1.21	0.51	0.68	1.12	0.47	0.63
1	3	4½	1	11.4	17.1	68	1.34	0.57	0.85	1.28	0.54	0.81	1.23	0.52	0.78	1.13	0.48	0.72	1.05	0.44	0.66
1	3	5	1	11.4	19.0	61	1.28	0.54	0.90	1.22	0.52	0.86	1.17	0.49	0.82	1.07	0.45	0.75	0.99	0.42	0.70
1	3	5½	1	11.4	20.9	56	1.22	0.52	0.94	1.16	0.49	0.90	1.11	0.47	0.86	1.01	0.43	0.78	0.93	0.39	0.72
1	3	6	1	11.4	22.8	52	1.16	0.49	0.98	1.11	0.47	0.94	1.05	0.44	0.89	0.96	0.41	0.81	0.88	0.37	0.74
1	3	6½	1	11.4	24.7	48	1.12	0.47	1.02	1.06	0.45	0.97	1.01	0.43	0.92	0.92	0.39	0.84	0.84	0.35	0.77
1	3	7	1	11.4	26.6	45	1.07	0.45	1.05	1.01	0.43	0.99	0.96	0.40	0.95	0.87	0.37	0.86	0.80	0.34	0.79
1	3	7½	1	11.4	28.5	42	1.03	0.44	1.09	0.97	0.41	1.02	0.92	0.39	0.97	0.83	0.35	0.88	0.76	0.32	0.80
1	3	8	1	11.4	30.4	40	0.99	0.42	1.11	0.93	0.39	1.05	0.88	0.37	0.99	0.80	0.24	0.90	0.73	0.31	0.82
1	4	5	1	15.2	19.0	76	1.13	0.64	0.80	1.08	0.61	0.76	1.04	0.59	0.73	0.96	0.54	0.68	0.90	0.51	0.63
1	4	6	1	15.2	22.8	64	1.04	0.59	0.88	0.99	0.56	0.84	0.95	0.54	0.80	0.87	0.49	0.73	0.81	0.46	0.68
1	4	7	1	15.2	26.6	55	0.96	0.54	0.95	0.92	0.52	0.91	0.88	0.50	0.87	0.80	0.45	0.79	0.74	0.42	0.73
1	4	8	1	15.2	30.4	49	0.90	0.51	1.01	0.85	0.48	0.96	0.81	0.46	0.91	0.74	0.42	0.83	0.68	0.38	0.77
1	4	9	1	15.2	34.2	44	0.84	0.47	1.06	0.80	0.45	1.01	0.76	0.43	0.96	0.68	0.38	0.86	0.63	0.35	0.80
1	4	10	1	15.2	38.0	40	0.79	0.44	1.11	0.75	0.42	1.06	0.71	0.40	1.00	0.64	0.36	0.90	0.58	0.33	0.82
1	5	10	1	19.0	38.0	47	0.73	0.52	1.03	0.69	0.49	0.97	0.66	0.46	0.93	0.60	0.42	0.84	0.55	0.39	0.77
1	6	12	1	22.8	45.5	46	0.62	0.52	1.04	0.58	0.49	0.98	0.56	0.47	0.94	0.50	0.42	0.84	0.46	0.39	0.78

Note—Variations in the fineness of the sand and the compacting of the concrete may affect the quantities 10 per cent in either direction.

*Use 50 per cent columns for broken stone screened to uniform size. †Use 45 per cent columns for average conditions and for broken stone with dust screened out. ‡Use 40 per cent columns for gravel or mixed stone and gravel. §Use these columns for scientifically graded mixtures.

Table No. 17

Quantities of Materials for One Cubic Yard of Rammed Concrete Based on a Barrel of 4 Cubic Feet

(Reprinted by permission from Taylor & Thompson's "Concrete, Plain and Reinforced," page 232)

Proportions by Parts			Proportions by Volumes			Volume of Mortar in Terms of Percentage of Volume of Stone	Percentages of Voids in Broken Stone or Gravel														
							50%*			45%†			40%‡			30%§			20%§		
Cement	Sand	Stone	Packed Cement	Loose Sand	Loose Stone		Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone	Cement	Sand	Stone
			bbl.	cu. ft.	cu. ft.		bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd	bbl.	cu. yd.	cu. yd.	bbl.	cu. yd.	cu. yd.
1	...	1	1	...	4	89	4.99	...	0.74	4.80	...	0.71	4.62	...	0.69	4.23	...	0.63	3.91	...	0.58
1	...	2	1	...	8	49	3.57	...	1.06	3.37	...	1.00	3.20	...	0.95	2.84	...	0.84	2.56	...	0.76
1	...	3	1	...	12	35	...	...	...	2.60	...	1.16	2.45	...	1.09	2.13	...	0.95	1.90	...	0.84
1	...	4	1	...	16	28	...	...	...	...	...	...	...	...	...	1.71	...	1.01	1.51	...	0.89
1	...	5	1	...	20	24	...	...	...	...	...	...	...	...	...	1.43	...	1.06	1.26	...	0.93
1	...	6	1	...	24	22	...	...	...	...	...	...	...	...	...	1.22	...	1.08	1.07	...	0.95
1	...	7	1	...	28	20	...	...	...	...	...	...	...	...	...	...	...	...	0.94	...	0.98
1	...	8	1	...	32	18	...	...	...	...	...	...	...	...	...	...	...	...	0.83	...	0.98
1	...	9	1	...	36	17	...	...	...	...	...	...	...	...	...	...	...	...	0.75	...	1.00
1	...	10	1	...	40	16	...	...	...	...	...	...	...	...	...	...	...	...	0.68	...	1.01
1	...	11	1	...	44	15	...	...	...	...	...	...	...	...	...	...	...	...	0.62	...	1.01
1	...	12	1	...	48	15	...	...	...	...	...	...	...	...	...	...	...	...	0.57	...	1.01
1	1	1½	1	4	6	96	3.08	0.46	0.68	2.97	0.44	0.66	2.87	0.42	0.64	2.69	0.40	0.60	2.53	0.38	0.56
1	1	2	1	4	8	73	2.74	0.41	0.81	2.63	0.39	0.78	2.52	0.37	0.75	2.33	0.34	0.69	2.17	0.32	0.64
1	1	2½	1	4	10	59	2.47	0.37	0.91	2.35	0.35	0.87	2.25	0.33	0.83	2.06	0.31	0.76	1.90	0.28	0.71
1	1	3	1	4	12	50	2.25	0.33	1.00	2.13	0.32	0.95	2.03	0.30	0.90	1.85	0.27	0.82	1.70	0.25	0.76
1	1½	2	1	6	8	92	2.39	0.53	0.71	2.30	0.51	0.68	2.22	0.49	0.66	2.07	0.46	0.61	1.94	0.43	0.58
1	1½	2½	1	6	10	74	2.18	0.48	0.81	2.09	0.46	0.77	2.01	0.45	0.74	1.86	0.41	0.69	1.73	0.38	0.64
1	1½	3	1	6	12	62	2.01	0.45	0.89	1.91	0.42	0.85	1.83	0.41	0.81	1.68	0.37	0.75	1.56	0.35	0.69
1	1½	3½	1	6	14	54	1.86	0.41	0.96	1.77	0.39	0.92	1.68	0.37	0.87	1.54	0.34	0.80	1.42	0.32	0.74
1	1½	4	1	6	16	48	1.73	0.38	1.03	1.64	0.36	0.97	1.56	0.35	0.92	1.42	0.32	0.84	1.30	0.29	0.77
1	1½	4½	1	6	18	43	1.62	0.36	1.08	1.53	0.34	1.02	1.45	0.32	0.97	1.31	0.29	0.87	1.20	0.27	0.80
1	1½	5	1	6	20	39	1.52	0.34	1.13	1.43	0.32	1.06	1.35	0.30	1.00	1.22	0.27	0 90	1.11	0.25	0.82
1	2	3	1	8	12	74	1.81	0.54	0.80	1.74	0.52	0.77	1.67	0.50	0.74	1.54	0.46	0.68	1.44	0.43	0.64
1	2	3½	1	8	14	64	1.69	0.50	0.88	1.61	0.48	0.83	1.54	0.46	0.80	1.42	0.42	0.74	1.31	0.39	0.68
1	2	4	1	8	16	56	1.58	0.47	0.94	1.51	0.45	0.89	1.44	0.43	0.85	1.32	0.39	0.78	1.21	0.36	0.72
1	2	4½	1	8	18	51	1.49	0.44	0.99	1.41	0.42	0.94	1.34	0.40	0.89	1.23	0.36	0.82	1.18	0.34	0.75
1	2	5	1	8	20	46	1.40	0.42	1.04	1.33	0.39	0.98	1.26	0.37	0.93	1.15	0.34	0.85	1.05	0.31	0.78
1	2	5½	1	8	22	42	1.33	0.39	1.08	1.26	0.37	1.03	1.19	0.35	0.97	1.08	0.32	0.88	0.98	0.29	0.80
1	2	6	1	8	24	39	1.26	0.37	1.12	1.19	0.35	1.06	1.13	0.34	1.00	1.02	0.30	0.91	0.93	0.28	0.83
1	2½	3	1	10	12	86	1.65	0.61	0.73	1.59	0.59	0.71	1.53	0.57	0.68	1.42	0.52	0.63	1.33	0.49	0.59
1	2½	3½	1	10	14	75	1.55	0.57	0.80	1.48	0.55	0.77	1.42	0.52	0.74	1.32	0.49	0.68	1.23	0.46	0.64
1	2½	4	1	10	16	66	1.46	0.54	0.87	1.39	0.51	0.82	1.33	0.49	0.79	1.23	0.46	0.73	1.14	0.42	0.68
1	2½	4½	1	10	18	59	1.38	0.51	0.92	1.31	0.48	0.87	1.25	0.46	0.83	1.15	0.43	0.77	1.06	0.39	0.71
1	2½	5	1	10	20	54	1.31	0.48	0.97	1.24	0.46	0.92	1.18	0.44	0.87	1.08	0.40	0.80	0.99	0.37	0.73
1	2½	5½	1	10	22	49	1.24	0.46	1.01	1.18	0.44	0.96	1.12	0.41	0.91	1.02	0.38	0.83	0.93	0.34	0.76
1	2½	6	1	10	24	45	1.18	0.44	1.05	1.12	0.41	1.00	1.06	0.39	0.94	0.96	0.36	0.85	0.88	0.33	0.78
1	2½	6½	1	10	26	42	1.13	0.42	1.09	1.07	0.40	1.03	1.01	0.37	0.97	0.92	0.34	0.89	0 84	0.31	0.81
1	2½	7	1	10	28	39	1.08	0.40	1.12	1.02	0.38	1.06	0.96	0.36	1.00	0.87	0.32	0 90	0.79	0.29	0.82
1	3	4	1	12	16	75	1.35	0.60	0.80	1.30	0.58	0.77	1.25	0.56	0.74	1.15	0.51	0.68	1.08	0.48	0.64
1	3	4½	1	12	18	67	1.28	0.57	0.85	1.23	0.55	0.82	1.18	0.52	0.79	1.08	0.48	0.72	1.01	0.45	0.67
1	3	5	1	12	20	60	1.22	0.54	0.90	1.16	0.52	0.86	1.11	0.49	0.82	1.02	0.45	0.76	0.94	0.42	0.70
1	3	5½	1	12	22	55	1.16	0.52	0.95	1.11	0.49	0.90	1.06	0.47	0.86	0.97	0.42	0.79	0.89	0.40	0.72
1	3	6	1	12	24	50	1.11	0.49	0.99	1.06	0.47	0.94	1.01	0.45	0.90	0.92	0.41	0.82	0.84	0.37	0.75
1	3	6½	1	12	26	48	1.06	0.47	1.02	1.01	0.45	0.97	0.96	0.43	0.92	0.87	0.39	0.84	0.80	0.36	0.77
1	3	7	1	12	28	44	1.02	0.45	1.06	0.97	0.43	1.01	0.92	0.41	0.95	0.83	0.37	0.86	0.76	0.34	0.79
1	3	7½	1	12	30	42	0.98	0.44	1.09	0.93	0.41	1.03	0.88	0.39	0.98	0.79	0.35	0.88	0.73	0.32	0.81
1	3	8	1	12	32	39	0.94	0.42	1.11	0.89	0.40	1.05	0.84	0.37	1.00	0.76	0.34	0.90	0.69	0.31	0.82
1	4	5	1	16	20	75	1.08	0.64	0.80	1.03	0.61	0.76	0.99	0.59	0.73	0.92	0.55	0.68	0.86	0.51	0.64
1	4	6	1	16	24	63	0.99	0.59	0.88	0.95	0.56	0.84	0.91	0.54	0.81	0.83	0.49	0.74	0.77	0.46	0.68
1	4	7	1	16	28	55	0.92	0.54	0.95	0.88	0.52	0.91	0.83	0.49	0.86	0.76	0.45	0.79	0.70	0.42	0.73
1	4	8	1	16	32	48	0.86	0.51	1.02	0.81	0.48	0.96	0.77	0.46	0.91	0.70	0.42	0.83	0.64	0.38	0.76
1	4	9	1	16	36	43	0.80	0.47	1.07	0.76	0.45	1.01	0.72	0.43	0.96	0.65	0.39	0.87	0.60	0.36	0.80
1	4	10	1	16	40	40	0.75	0.44	1.11	0.71	0.42	1.05	0.67	0.40	0.99	0.61	0.36	0.90	0.55	0.33	0.81
1	5	10	1	20	40	47	0.70	0.52	1.04	0.66	0.49	0.98	0.63	0.47	0.93	0.57	0.42	0.84	0.52	0.38	0.77
1	6	12	1	24	48	46	0.59	0.52	1.05	0.56	0.50	1.00	0 53	0.47	0.94	0.48	0.43	0.85	0.44	0.39	0.78

Note—Variations in the fineness of the sand and the compacting of the concrete may affect the quantities by 10 per cent in either direction.

*Use 50 per cent columns for broken stone screened to uniform size. †Use 45 per cent columns for average conditions and for broken stone with dust screened out. ‡Use 40 per cent columns for gravel or mixed stone and gravel. §Use these columns for scientifically graded mixtures.

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